



NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

THESIS

**IMPROVED WEB 2.0 STRATEGY FOR FEMA TO ENABLE
COLLABORATION AND A SHARED SITUATIONAL
AWARENESS ACROSS THE WHOLE OF COMMUNITY**

by

Samuel Rhodes Johnson, II

March 2012

Thesis Advisor:
Second Reader:

Richard Bergin
Christopher Bellavita

Approved for public release; distribution is unlimited

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE			<i>Form Approved OMB No. 0704-0188</i>	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE March 2012	3. REPORT TYPE AND DATES COVERED Master's Thesis	
4. TITLE AND SUBTITLE Improved Web 2.0 Strategy for FEMA to Enable Collaboration and a Shared Situational Awareness Across the Whole of Community			5. FUNDING NUMBERS	
6. AUTHOR(S) Samuel Rhodes Johnson II				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. government. IRB Protocol number _____ n/a_____.				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited			12b. DISTRIBUTION CODE A	
13. ABSTRACT (maximum 200 words) The Federal Emergency Management Agency (FEMA) has adopted a Whole of Community approach to emergency management, and seeks to enhance emergency management outcomes through improved preparedness, response and recovery efforts. The significant amount of time and money required engaging disparate partners, technological and cultural barriers to interoperability, and a lack of training/familiarity with each other inhibits the collaboration necessary to achieve a state of shared situational awareness. A lack of shared situational awareness results in an incomplete operating picture, which complicates decision-making and can lead to inefficient preparedness, response and recovery activities. This thesis explores the terms situational awareness, shared situational awareness, collaboration and common operating picture. It argues that a common operating picture is a state of shared situational awareness achievable only through the process of collaboration, which can be greatly enhanced through a comprehensive Web 2.0 strategy. The thesis reviews FEMA's current strategy for Web 2.0, and using a structure of appreciative inquiry and successful implementations of Web 2.0 as a guide, proposes strategy adjustments for FEMA. A comprehensive Web 2.0 strategy can foster a culture of collaboration, which will significantly increase FEMA's ability to achieve enhance emergency management outcomes and support the Whole of Community. FEMA's strategy has applicability throughout the homeland security enterprise, as all agencies therein seek a state of shared situational awareness reflected in a common operating picture, and all are considered part of the Whole of Community.				
14. SUBJECT TERMS Web 2.0, collaboration, situational awareness, shared situational awareness, common operating picture, emerging technology, social media, Federal Emergency Management Agency (FEMA)			15. NUMBER OF PAGES 89	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UU	

THIS PAGE INTENTIONALLY LEFT BLANK

Approved for public release; distribution is unlimited

**IMPROVED WEB 2.0 STRATEGY FOR FEMA TO ENABLE
COLLABORATION AND A SHARED SITUATIONAL AWARENESS ACROSS
THE WHOLE OF COMMUNITY**

Samuel Rhodes Johnson, II
Watch Officer, Federal Emergency Management Agency
BA, U.S. Coast Guard Academy, 1997
MS, National Graduate School, 2008

Submitted in partial fulfillment of the
requirements for the degree of

**MASTER OF ARTS IN SECURITY STUDIES
(HOMELAND SECURITY AND DEFENSE)**

from the

**NAVAL POSTGRADUATE SCHOOL
March 2012**

Author: Samuel Rhodes Johnson, II

Approved by: Richard Bergin
Thesis Advisor

Christopher Bellavita
Second Reader

Dan Moran, PhD
Chair, Department of National Security Affairs

THIS PAGE INTENTIONALLY LEFT BLANK

ABSTRACT

The Federal Emergency Management Agency (FEMA) has adopted a Whole of Community approach to emergency management, and seeks to enhance emergency management outcomes through improved preparedness, response and recovery efforts. The significant amount of time and money required engaging disparate partners, technological and cultural barriers to interoperability, and a lack of training/familiarity with each other inhibits the collaboration necessary to achieve a state of shared situational awareness. A lack of shared situational awareness results in an incomplete operating picture, which complicates decision-making and can lead to inefficient preparedness, response and recovery activities. This thesis explores the terms *situational awareness*, *shared situational awareness*, *collaboration* and *common operating picture*. It argues that a common operating picture is a state of shared situational awareness achievable only through the process of collaboration, which can be greatly enhanced through a comprehensive Web 2.0 strategy. The thesis reviews FEMA's current strategy for Web 2.0, and using a structure of appreciative inquiry and successful implementations of Web 2.0 as a guide, proposes strategy adjustments for FEMA. A comprehensive Web 2.0 strategy can foster a culture of collaboration, which will significantly increase FEMA's ability to achieve enhance emergency management outcomes and support the Whole of Community. FEMA's strategy has applicability throughout the homeland security enterprise, as all agencies therein seek a state of shared situational awareness reflected in a common operating picture, and all are considered part of the Whole of Community.

THIS PAGE INTENTIONALLY LEFT BLANK

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
A.	PROBLEM STATEMENT	3
B.	RESEARCH QUESTION	4
C.	SIGNIFICANCE OF RESEARCH	5
II.	LITERATURE REVIEW	7
A.	SITUATIONAL AWARENESS	7
B.	COLLABORATION.....	8
C.	SHARED SITUATIONAL AWARENESS.....	12
D.	WEB 2.0	13
E.	FEMA POLICY AND STRATEGY.....	17
F.	CONCLUSIONS	19
III.	METHODOLOGY	21
A.	SUMMARY	21
1.	Comparative Case Analysis	21
2.	Appreciative Inquiry	21
B.	SAMPLE/DATA COLLECTION	22
1.	Comparative Case Analysis	23
a.	<i>The Transportation Security Administration’s (TSA) Idea Factory.....</i>	<i>23</i>
b.	<i>Ushahidi</i>	<i>24</i>
2.	Appreciative Inquiry	25
C.	DATA ANALYSIS.....	25
1.	Collective Hermeneutics.....	25
2.	Appreciative Inquiry	28
IV.	COMPARATIVE CASE STUDIES	31
A.	TSA—IDEA FACTORY	31
B.	USHAHIDI	35
V.	ANALYSIS	39
A.	COMPARATIVE CASE STUDY ANALYSIS	39
1.	TSA—IDEA Factory ANALYSIS	39
2.	USHAHIDI ANALYSIS	42
B.	APPRECIATIVE INQUIRY ANALYSIS	44
1.	FEMA’s Discovery Phase Analysis.....	44
2.	Practices To Be Continued	45
a.	<i>Monitoring of Social Media In National And Regional Watch Centers</i>	<i>45</i>
b.	<i>Adobe Connect</i>	<i>46</i>
c.	<i>Go-To-Meeting</i>	<i>46</i>
d.	<i>External Affairs Use Of Social Media</i>	<i>46</i>
3.	FEMA’s Dream Phase Analysis.....	46

4.	FEMA’s Design Phase Analysis	47
5.	FEMA’s Destiny Phase Analysis.....	47
VI.	FINDINGS AND RECOMMENDATIONS	49
A.	COMPARATIVE CASE ANALYSIS	49
1.	Idea Factory Findings and Recommendations.....	49
2.	USHAHIDI Findings and Recommendations	50
B.	APPRECIATIVE INQUIRY FINDINGS AND RECOMMENDATIONS.....	51
1.	FEMA’s Discovery Phase Findings and Recommendations	51
2.	Recommendations For Status Quo Practices	51
a.	<i>Monitoring Of Social Media In National and Regional Watch Centers</i>	<i>51</i>
b.	<i>Adobe Connect</i>	<i>52</i>
c.	<i>Go-To-Meeting.....</i>	<i>53</i>
d.	<i>External Affairs Use Of Social Media</i>	<i>54</i>
3.	FEMA’s Dream Phase Findings and Recommendations	55
a.	<i>Principle Of Teamwork.....</i>	<i>55</i>
b.	<i>Principle Of Engagement</i>	<i>55</i>
c.	<i>Principle Of Empowerment</i>	<i>57</i>
4.	FEMA’s Design Phase Findings and Recommendations	57
a.	<i>Pitfalls.....</i>	<i>59</i>
C.	FEMA’S DESTINY PHASE FINDINGS AND RECOMMENDATIONS.....	61
VII.	CONCLUSIONS	63
A.	SUMMARY OF FINDINGS	63
B.	LIMITATIONS OF RESEARCH	64
C.	MITIGATION OF LIMITATIONS.....	65
D.	SIGNIFICANCE OF RESEARCH	66
E.	FURTHER RECOMMENDED RESEARCH.....	67
	LIST OF REFERENCES	69
	INITIAL DISTRIBUTION LIST	75

LIST OF ACRONYMS AND ABBREVIATIONS

AI	Appreciative Inquiry
CAA	Colonial Academic Alliance
CBRNE	Chemical, Biological, Radiological, and Explosives
CHDS	Center for Homeland Defense and Security
COP	Common Operating Picture
DAD	Decide Advocate Defend
DHS	Department of Homeland Security
DOD	Department of Defense
EA	External Affairs
EOC	Emergency Operations Center
EPIC	Electronic Privacy Information Center
ESF	Emergency Support Function
FEMA	Federal Emergency Management Agency
GPS	Global Positioning System
HS	Homeland Security
HSIN	Homeland Security Information Network
HQ	Headquarters
IABC	International Association of Business Communications
IMAT	Incident Management Assistance Team
MCOV	Mobile Communications Operations Vehicle
MMS	Multimedia Messaging Service
MOC	MERS Operations Center
NCR	National Capital Region
NOAA	National Oceanographic Atmospheric Agency
NOC	National Operations Center
NPS	Naval Post Graduate School
NRCC	National Response Coordination Center
NRCS	National Response Coordination Staff
NWC	National Watch Center
NWS	National Weather Service

OPA	Office of Public Affairs
PTA	Privacy Threshold Analysis
PUB 1	Publication 1
RELIEF	Research and Experimentation for Local and International First Responders
RWC	Regional Watch Center
SA	Situational Awareness
SAVER	Situational Awareness Viewer for Emergency Response
SFI	Strategic Foresight Initiative
SLB	Senior Leadership Briefing
SLO	State Liaison Officer
SM	Social Media
SMS	Short Message Service
SSA	Shared Situational Awareness
TSA	Transportation Security Administration
TSO	Transportation Security Officer
USAID	United States Agency for International Development
USG	U.S. Government
WOC	Whole of Community

ACKNOWLEDGMENTS

*Two roads diverged in a yellow wood, and sorry I could not travel both and
be one traveler, long I stood... I took the one less traveled by, and that has
made all the difference. (Robert Frost, 1920)*

I would like to first and foremost thank God for blessing me to be a part of this program and granting me the favor to complete it. I owe a special thanks to all of those who believed in me enough to support my application, subsequent acceptance, and process through the CHDS program. Russell Washington deserves special mention as he epitomizes servant leadership and supported me through every step. I am also grateful to William Carville who endorsed me and truly believed in my abilities to complete this challenging field of study. Thank you to all my instructors who did not allow me to stare idly at the fork in the road but challenged me to travel outside my comfort zone. I will forever be grateful to your tutelage and look forward to working with many of you in the future. I truly appreciate the efforts of Professor Bellavita who challenged me to think bigger and write better than I ever thought I could, and Professor Bergin who is one of the most humble and giving people I know. Thank you both for helping me massage a fuzzy idea into a coherent thesis. BIG thank you to Cat for lightning quick editing! Thank you to my family, namely my Mother, who believed in me and continuously asked when I was going to get off my butt and write something. Special thanks to Tamekia and Mia who dealt with all the sleepless nights, travel, mood swings and stress that goes with the program. I love you to life!

Lastly, to my fellow classmates of cohort 1005/1006, we did it! I could not be prouder of all of you and am truly honored to be counted among you. Thanks Anthony for the most important intro of the year! From the kid from Brooklyn and the tank commander (my inner circle) to the Holy Father, the actor, and the Mahddi; I will miss the fire pit, getting kicked out of snacko's room, golfing with my fam, Gigs'mobile (he has the best cars), Bi-Rite with Nate (and your socks), Sapporo's with Greg (GLORIA), DWL humor, karaoke crew, zinfusion with my sistas...the list goes on. I look forward to our future discussions and collaboration. Have a Magical Day and don't hesitate to call if you ever need anything.

THIS PAGE INTENTIONALLY LEFT BLANK

I. INTRODUCTION

As if an icy dragon has been awakened from an ancient slumber; its wintry breath wreaking havoc on everything within its path, a 65 mile per hour gust whips across the Puget Sound knocking down power lines and ripping trees up by their roots. The resultant power outage interrupts Christmas dinner preparations and delays holiday commuters for hours. The media headlines read, “Christmas Cancelled as Major Winter Storm destroys the Pacific North West! Thousands without power and holiday commuters trapped in their cars as downed power lines disable the interstate.” Further down in the article it states, “With government agencies on holiday vacation, it may be weeks before power is restored. Will this cold and dark Christmas foreshadow how Washington State rings in the New Year? Only time will tell.”

Across the country, in Washington, D.C., the Department of Homeland Security (DHS) National Operations Center (NOC) media-monitoring site sees this article and forwards it throughout DHS. The phone lines light up at the both the NOC and the Federal Emergency Management Agency (FEMA) National Watch Center (NWC); Leadership wants answers, “What are we doing to solve this problem?” The real question is, does a problem actually exist? To find the answer, the analyst at the NWC calls the FEMA Region X Mobile Emergency Response Systems Operations Center (MOC). The MOC in turn calls the Washington State Emergency Operations Center (EOC), which happens to be closed. The MOC reports “no information available.” Based on this information, leadership decides to take action. A mobile communications operations vehicle (MCOV), an Incident Management Assistance Team (IMAT), and a state liaison officer (SLO) are all deployed to the scene to offer assistance and re-establish communications in the area. When they arrive, they find that the power is actually already on at the EOC; it is just closed. The SLO eventually speaks with a state representative who notifies him that the power outages were sporadic and only impacted roughly 10 percent of two counties. Power line restoration crews had already been dispatched, and the power had been restored to most areas. All power was anticipated to

be back by that evening. As far as the interstate, it was only blocked in one location and the traffic had been diverted. Commutes were delayed by a few hours, but traffic was moving.

How did such a small, local event spin up into such a large response at a national level? In his rendition of the Indian fable about six blind men and an elephant, John Godfrey Saxe illustrates how learned men can each be partly in the right yet all be in the wrong (Saxe, 1880). As the fable goes, six blind men all feel a part of an elephant and then argue about what the animal is based on only having felt/experienced/or “saw” one aspect of the whole. To one the elephant is like a tree, to another like a rope, yet another says it is a fan, etc. based upon which part of the elephant they felt (leg, tail, ear, etc.). In a similar fashion, without the ability to collaborate and share information, homeland security practitioners are only able to see and understand a part of the whole in regards to a disaster. When they attempt to explain a situation, they provide a partly right yet wrong picture because they have only felt one part and have made value judgments based upon it.

Traditional means of communication can be cumbersome, slow, and often inaccurate. Though the above situation was a dramatization, events very similar to this one have actually occurred. Similar to the blind men and the elephant, limited information only provides a piece of the picture. With the understanding that they are dealing with a rope or a wall or a tree, leaders make executive decisions accordingly to the detriment of both their agency and the American public. Throughout the homeland security enterprise, professionals quest for a common operating picture as adventurers in search of the Holy Grail. This thesis posits that a common operating picture is not some mystical, unachievable entity, but rather a state of shared situational awareness created through collaboration. To go further with the elephant example, if the blind men had collaborated on understanding the elephant and contributed their individual knowledge as a part of the puzzle, they might have amassed a very accurate picture of an elephant without having ever seen one. In this fashion, each member of the homeland security enterprise is able to contribute a piece of the puzzle needed to see a common operating picture. From that premise, this thesis will argue that a better way of doing business is

readily available through the use of Web 2.0. The collaborations enabled by this technology are able to provide a state of shared situational awareness in which the full elephant can be seen. With the proper perspective, executive decision makers are equipped with the knowledge necessary to allocate the resources that have been entrusted to them efficiently and effectively.

A. PROBLEM STATEMENT

To better understand the problems inherent with trying to create a state of shared situational awareness, this thesis views the issue from the perspective of the Federal Emergency Management Agency (FEMA). FEMA has adopted a Whole of Community approach to emergency management. The Whole of Community is a partnership between the entire team of homeland security professionals (federal, state, local, interagency) and all aspects of a community, inclusive of public sector, private sector, volunteers, civic organizations, faith and community-based organizations, and disaster survivors themselves regardless of gender, race, economics, background or other demographics. Through the Whole of Community, FEMA hopes to build resiliency and improve emergency management outcomes. This approach represents a paradigm shift from “government-centric” strategies to a community-focused strategy that both leverages and serves the public. During disasters, the public has historically been viewed/treated as victims, liabilities, etc. The Whole of Community approach challenges the homeland security community to view these entities as partners and part of the larger team.

The challenges FEMA faces in regards to the Whole of Community are the significant amount of time and money required to engage disparate partners, technological, and cultural barriers to interoperability, and a lack of training/familiarity with each other. This situation might be improved through the use of Web 2.0, however. FEMA’s current uses of this technology are not optimal and, in a catastrophic event, may prove to be insufficient; the Whole of Community is not fully engaged, prohibiting a state of shared situational awareness. As an example, the only office allowed to respond/engage in social media dialogue is the Office of External Affairs, whose primary goals concern public messaging. Operations personnel within FEMA are limited to

monitoring social media to pull information from ongoing conversations. Current engagement in discourse with traditional homeland security partners or the extended Whole of Community at an operational level is limited to phone calls, emails, teleconferences, and, at best, video teleconferences when possible. While these means can improve situational awareness, there are significant time delays, redundancies, and inaccuracies involved. During hurricane response, to further the example, impacted states submit situation reports. FEMA regions incorporate those into their situation reports, which are then compiled into the National Response Coordination Center's (NRCC) input to the Department of Homeland Security (DHS) Senior Leadership Briefing (SLB). A video teleconference is then held at 12:30 pm for all partners to discuss critical issues. The awareness of each member of this process is limited to the snapshot in time captured in the report that they read. The overall lack of shared situational awareness is evident in comments often heard during these teleconferences: "those don't match the numbers I have," "that's not the latest information I have," "that's not an accurate assessment," etc. From this fragmented state, it is very difficult to agree upon a common operating picture from which to make executive decisions regarding response, recovery, and other emergency management activities. This can cause significant delays in essential services and hinder a community's ability to stabilize a situation, to recover quickly from it, and to build a collective resilience for future events.

B. RESEARCH QUESTION

How can Web 2.0 applications facilitate collaboration across the Whole of Community to develop shared situational awareness? To answer this question, the following secondary questions are addressed also:

1. What is situational awareness, collaboration, and shared situational awareness?
2. What is Web 2.0, and how is homeland security using it?
3. What is FEMA's Web 2.0 policy and what is their current strategy for its use?

Through the secondary questions, the thesis will review FEMA's application of Web 2.0 as it relates to the Whole of Community to discover whether collaboration with all applicable stakeholders is enabled and shared situational awareness achieved.

C. SIGNIFICANCE OF RESEARCH

This thesis has applicability throughout the homeland security enterprise. Every agency within it is considered a part of the Whole of Community. Through a state of shared situational awareness, they can achieve a common operating picture needed to make decisions and have a positive impact on emergency management outcomes. Web 2.0 technologies are evolving at a rapid rate, and, while homeland security agencies are engaging in some aspects of it, they are not fully taking advantage of its capabilities. There remains a large resistance to the technology due to security, privacy, and other concerns. A failure to engage relevant partners during an event, however, will result in an incomplete and inaccurate shared situational awareness. This will lead to poor decisions and, consequently, inefficient responses to events. An understanding of how policy and strategy can guide Web 2.0 implementation is critical to preventing this state. Homeland security leaders can use this thesis to overcome resistance within their agencies concerning incorporating this emerging technology, and the entire enterprise can benefit from improved shared situational awareness.

THIS PAGE INTENTIONALLY LEFT BLANK

II. LITERATURE REVIEW

A. SITUATIONAL AWARENESS

How can I tell what I think until I see what I say? (E.M. Forster, 1927)

The term situation awareness was first attributed to fighter pilots in World War I, and it referred to a pilot's ability to ascertain his adversaries' intentions and anticipate his moves so that he could counter them (Toner, 2009). Carol (1992) defines it as the cumulative effects of everything an individual is and does as applied to mission accomplishment. Other military definitions reviewed seem to focus on a continuous cycle of sensing elements of the environment, filtering them through training and experience, to make some sort of value judgment and then anticipating actions based upon the resultant understanding. Endsley's (1988) model perhaps provides one of the most widely accepted and all-encompassing definitions as it includes a factor of time and space and breaks situational awareness down into three hierarchical levels: perception, comprehension, and projection. The perception level deals with knowledge obtained by monitoring, detecting, and recognizing data. The comprehension level deals with the development of understanding, which is a combination of interpreting and evaluating data based upon experience, perceptions, and other factors. Endsley's work provides components through which to better understand a state of knowledge. It is important to note that several of the definitions of situational awareness split around whether it is considered a product (i.e., a state to be obtained, or a process by which knowledge) or understanding is obtained.

Nofi (2000) laments not being able to find a standard/accepted definition and lists several attempts in his paper for the Center of Naval Analysis. He settles on defining situational awareness as a dynamic mental model of one's environment, which is essentially a process of perception and comprehension about one's environment that leads to projections that allow for predictions (Nofi, 2000). Nofi's model was derived in part from Endsley's work, and it stresses the continuous nature of situational awareness as the end state or product of this iterative process, which Endsley calls "situation

assessment” (1995). As we are continuously perceiving, comprehending, and projecting, Nofi offers that our situational awareness is continuously evolving as well (2000). Smith & Hancock (1995) surmise it succinctly as a “generative process of knowledge creation,” which speaks to the idea that there is a cyclical process to situational awareness where a person is informed by the environment, forms knowledge about a situation, which in turn guides his or her activity within the environment and his or her activity alters the environment leading to new information and thus new knowledge. Toner makes an astute observation that situational awareness is not just all information, but the right information in regards to the right amount of relevant information (2009).

As to what is relevant, the Homeland Security Act defines situational awareness as “information gathered from a variety of sources that, when communicated to emergency managers and decision makers, can form the basis for incident management decision-making” (U.S. Congress, 2002). The information that supports situational awareness is any information that is pertinent to the decisions that depend upon a person’s awareness of the situation. The literature appears to be in agreement on the point that the goal of situational awareness is ultimately to be able to make decisions or take some course of action. A person’s or organization’s situational awareness guides immediate decisions and actions as well as future decisions and actions, because his or her awareness is used to make predictions about the future. Situational awareness is improved in the same way it is developed, through a process of collecting information, sensing one’s environment, and putting those inputs through a comprehension filter of past experience and knowledge to arrive at an understanding about a situation at a point in time. As people and organizations interact with each other, they each contribute to each other’s situational awareness, and there is an opportunity for them to learn from each other and develop a sense of shared situational awareness. The next section discusses the process by which this occurs.

B. COLLABORATION

Reflection on a given pre-understanding brings before me something that otherwise happens behind my back. (Gadamer, 1976)

Collaboration is a very broad term that has been used to describe several different types of processes for many different purposes. The taxonomies of collaboration created by Bolstad and Endsley (2003) illustrate how broad the term collaboration is. They created taxonomies of collaboration to rate the degree to which different collaboration tools support different types of collaboration characteristics, tool characteristics, information types, and collaboration processes. One-way communications versus two-way interactivity, co-located versus distributed, and synchronous versus asynchronous are some of the characteristics that help determine the type of collaboration being discussed. The focus of this literature review is on collaboration as a process to develop shared situational awareness. The majority of literature reviewed referred to Gray's (1989) definition of collaboration as an emergent and dynamic process involving joint decision making among key stakeholders centered on a specific problem domain. Joint decision-making indicates more than just the actions of working together, cooperating, or coordinating; it infers agreement. In the previous section, the goal of situational awareness was to make decisions, which would suggest that collaboration is a process of developing situational awareness.

Walker and Elberson (2005) explore collaboration in a technological environment and presents a definition of collaboration as working jointly together in an intellectual endeavor. The intellectual endeavor Walker hints at is that of making sense of, or developing understanding of, a problem, which the group does jointly. Gray further describes collaboration as a temporary forum within which consensus about a problem can be sought and collective action to solutions can be taken (1989). Consensus indicates that the stakeholders are not just developing individual situational awareness, but it reiterates a sense of agreement or a shared situational awareness that results from the process of collaboration. It is from the state of shared situational awareness that decisions can be made and collective actions taken.

Pelfery (2005) applies this to homeland security in his definition of "agencies, organizations, and individuals from many tiers of public and private sectors, working, training, and exercising together for the common purpose of preventing terrorist threats to people and property." In Pelfrey's definition, the problem domain is homeland security

and the collaboration process involves developing consensus about terrorist threats in order to make decisions on how to prevent them. The process of collaboration is one in which situational awareness of individual stakeholders is shared in order to arrive at shared situational awareness for the purpose of making decisions or taking collective actions. In Pelfrey's example, shared situational awareness allows homeland security stakeholders to make joint counterterrorism decisions.

Majumdar (2006) conducted a comprehensive literature review of collaboration among government agencies with a focus on New Zealand and surmised that key factors in collaboration include interdependence among participating organizations who share a goal of achieving better outcomes, commitment to a mutual understanding, respect, and trust. Majumdar's review looks at collaboration from a service-related point of view, focusing on the service delivery to individuals or groups. He cites Melville, Blank, and Asayes (1993); Prefontaine, Ricard, Sicotte, Turcotte, and Dawes (2000); Gray (1989); and Bardach (1998), all of whom define collaboration in terms of joint activity between organizations with shared problems and common goals. The authors differ greatly in terms of the purpose for the collaboration; however, they agree on the value of interdependency to solve shared problems as a key to successful collaboration.

Hocevar, Jansen, and Thomas (2004) studied how to build collaborative capacity for homeland security to address problems, and they have reported similar findings regarding interdependencies, common vision, and common goals as being key factors to effective collaboration. Hocevar et al. research shows collaboration works best when the stakeholders involved are focused on common problems that can only be solved through their collective action. It is their interdependency that draws them together and a need to solve a common problem that drives them to work together.

Rather than focusing on stakeholders, Walker and Elberson focus on technology. They suggest that technology is the key to being able to create an environment that enables collaboration (2005). The document sharing, chat, instant messaging, streaming, etc. tools she presents are Web-enabled products supported in Web 2.0. Though they do not use these exact words, basically Walker and Elberson suggest a comprehensive Web 2.0 strategy is a key to fostering effective collaboration. This is supported by Gadman

(1997), who wrote about the use of the internet as a place for collaborative dialogue. Gadman challenges leaders to move beyond traditional approaches and to use dialogue empowered by free access to information to create synergy and transform an organization (Gadman, 1997). As a shared situational awareness emerges, stakeholders develop a more accurate view of the events. A more accurate view increases the chances for good decisions and an improved capacity. An example of this can be seen in the area of college consortia.

The Colonial Academic Alliance (CAA) is an academic consortium of 12 universities on the East Coast. The member institutions of the CAA systematically share knowledge through the consortium. Staff members in student affairs, global education, assessment, and advancement are able to better adapt to the rapid pace of change on their campuses through the collaboration of the consortium. “A successful consortium supports its participants through shared risk and reward,” Baus and Ramsbottom observe, “at the same time strengthening the capacity of each partner college to pursue its unique institutional mission” (1999). The institutions share the risks of being outdated and losing current and future students. They share a common goal of providing a quality service to current students and attracting new recruits. The colleges need to continually adjust to the latest technologies and transform to meet the needs of the new generation of students. This is supported by Forcier, who states, “The collaboration among institutions that is facilitated by consortia is a vital lever for transformational change—the type of change that will enable colleges and universities to not just survive but to prosper” (2011). Baus and Ramsbottom (1999) add to Forcier, “Consortia exist to serve their members’ needs; they do so, however, by creating an entity that leverages the strengths of the individual members and goes beyond the sum of the parts. The mission of any consortium is to enable the members to achieve together, through cooperation, what cannot be achieved alone”. The idea of interdependency is reiterated in the consortium example in that the colleges are accomplishing something they could not do individually. A state of shared situational awareness provides a vantage point that can propel the organization, stakeholders, community to a higher level of performance, innovation, and capacity.

C. SHARED SITUATIONAL AWARENESS

Nofi (2000) defines shared situational awareness as a state in which all of the stakeholders understand a given situation in the same way. The last section discussed how this state is achieved through a process of collaboration. The literature makes a distinction between team situational awareness and shared situational awareness. A team is a distinguishable set of two or more stakeholders who interact interdependently towards a common goal, each with a specific role or function to perform (Salas, Dickonson, Converse, & Tannenbaum, 1992). The interdependencies and common goals that were cited as indicators for potentially successful collaborations indicate that collaboration works best for teams. Team situational awareness, however, is defined as two or more stakeholders' situational model from which they predict future states (Artman & Garbis, 1988). Endsley (1995) qualifies this as being the degree to which the team members possess the situational awareness needed for their particular responsibility versus shared situational awareness being the degree to which team members possess the same situational awareness.

Combining Endsley and Nofi, shared situational awareness involves stakeholders understanding a situation the same way. As the collaboration section described it, developing consensus. Shu and Furuta (2005) bring up a key point that shared situational awareness is not a "group mind" as it occurs through the interaction of their individual minds. In other words, shared situational awareness is a mutual awareness of each mind involved in the collaboration. The word "mind" could be replaced with "situational awareness" (i.e., the process of collaboration causes stakeholders to share their individual situational awareness). Through the process of their interaction, discourse, etc., each stakeholder arrives at a state of shared situational awareness where each is mutually aware and in consensus. In a team, shared situational awareness includes the team member's awareness of the other team member's needs and how a situation or action affects each. The teams are focused on accomplishing common goals, and the ability to do so is dependent on each individual stakeholder/team member being able to do their part. Again, the interdependency involved means no one stakeholder could accomplish the task/solve the problem independently of the others.

This separates teams from arbitrary groups of people who collaborate to develop a shared situational awareness of a situation. Arbitrary groups do not share common goals and do not have the same motivations for collaboration as a team. The Whole of Community represents the national emergency management team, and, in their collaboration, they share common goals of efficient and effective emergency management outcomes. Shared situational awareness for the Whole of Community drives decision-making and collective actions. Surowieki (2005) describes it as enhanced knowledge or wisdom that results from aggregating individual's situational awareness to arrive at the best collective decision. The literature addressed the importance of team compositions to the quality of shared situational awareness obtained; however, a consistent gap exists as to specifics on determining group compositions.

The research did not indicate any literature that addressed homeland security specific team compositions for enhanced shared situational awareness; however, Hocevar et al. (2004), Walker and Elbertson (2005), and Gadman (1997) all suggest that teams should be as diverse as possible. The more disciplines and skills, with the caveat that they all be disciplines and skills interdependent of each other in regards to the problem being faced, the better the resultant shared situational awareness. By taking a holistic approach via the Whole of Community, FEMA significantly increases the chance of engaging the right partners and achieving the most comprehensive shared situational awareness. The product of shared situational awareness is a common operating picture. FEMA defines a common operating picture as a standard overview of an incident that enables stakeholders to make effective, consistent and timely decisions (Federal Emergency Management Agency [FEMA], 2009). A common operating picture can be graphically represented on a map, through slides, and various other medium. It is a physical view of the shared situational awareness obtained from a process of collaboration.

D. WEB 2.0

The range of technology that constitutes Web 2.0 is continuously evolving and their applications appear to be limitless. As comprehensive review of all the literature

related to Web 2.0 is beyond the scope of this thesis, this review will focus on core capabilities, current applications within homeland security and how it relates to collaboration, shared situational awareness, and a common operating picture. The majority of the literature about Web 2.0 refers back to Oreilly's work in 2005, in which he provided a meme map and described the core competencies that unite the plethora of Web 2.0 applications. Oreilly (2005) describes Web 2.0 as a platform without boundaries that radiates out from a set of core ideas. These core ideas can be summarized as applications and services that harness collective intelligence, treat users as co-developers, loosely connect systems designed to connect and re-use services of other systems, are written for multiple devices and leverage different types of users from niche markets to self-service. Leveraging different types of users supports the diversity that is desired in successful collaborations and harnessing their collective intelligence is the goal of collaboration in order to produce shared situational awareness. Oreilly's work provides a solid baseline for understanding commonalities between the myriad of applications that have evolved under the Web 2.0 umbrella. It has stood the test of time in that these core competencies remain after six years of evolution. The key concept that transcends various types of Web 2.0 technologies is the more they are used, the better they become. In other words, the technology improves as people use it. Though not all inclusive, the combined works of Jones (2006) and Waldrop (2008) give a good picture of the concurrent projects that contributed to Web 2.0 evolution over time. Jones accurately summarizes the resultant Web 2.0 as "all the Web sites out there that get their value from the actions of users" (2006).

Rheingold (1993) adds considerably to this summation in his discussion of Engelbart's contributions to the internet. Rheingold (1993) keys in on Engelbart's vision of computers extending and amplifying human thinking and communication in such a way that groups of people would solve complex problems. Web 2.0 enables the process of human thinking and communication to solve complex problems, which means the process of collaboration to develop a shared situational awareness from which complex problems can be solved. Rheingold's work is highly relevant to this thesis as he wrote from the perspective of an avid user of social software. He discusses how virtual

communities bring about social changes and add value in real life. In addition, he theorizes two key concepts this thesis will explore: One, social software offers a sense of community stronger than what users feel for their physical communities in real life, and, consequently, the users are motivated to participate in levels they would not through other forms of communication (Rheingold, 1993). Two, in general, people are not as interested in static information on a screen as they are with interacting with each other and the material presented (Rheingold, 1993). These two concepts suggest that through the collaboration inherent in Web 2.0 applications, particularly social software, people are able to self-actualize as indicated in the highest level of Maslow's hierarchy of needs (1943). Self-actualization, the fifth level, represents the full potential of what a person believes they can be/achieve (Maslow, 1943). This is a very individual and personal level and it has widely different meanings for different people. All people have their own view of what their ideal state is and what achievements have meaning for them. Online communities support this in that each community provides a different way for members to distinguish and differentiate themselves. For some sites, like Yelp, there is an opportunity to obtain an elite status based on the amount of postings, "likes," etc. Other sites employ similar ways of recognizing members who participate often. This desire to feel special or be recognized can be seen in the commonly heard "I'm your biggest fan" comments often made to celebrities. This motivates them to be an active participant leading to a sense of accomplishment, moving them closer to a feeling of self-actualization.

The seminal works of O'Reilly (2005), Jones (2006), and Waldrop (2008) provide a foundation for understanding the concepts, history, and evolution of Web 2.0 technology, while Rheingold (1993) provides insight into why it is successful and the potential power this technology has to meet people's needs and motivate collaboration. What is missing from all this, is an explanation of how it applies, or is being applied, towards the Whole of Community. In her thesis on optimizing citizen engagement during emergencies through Web 2.0, Van Leuven states, "Literature that addresses the use of technology in emergency management or homeland security applications is lacking" (2009). Though literature has increased since her thesis, it is focused on specific aspects of Web 2.0 not

related to this line of research. Drapeau and Wells joined forces at the National Defense University in 2009 and performed an initial net assessment for the Department of Defense (DoD) regarding social software uses in U.S. government (USG) departments and agencies and their implications toward national security (Drapeau & Wells, 2009). This the most comprehensive work to date that consolidates social software applications across the broad spectrum of USG entities. While not exhaustive, it provides an excellent baseline for the justification of incorporating and building upon Web 2.0 and social software strategies across the USG. Pertinent to this thesis, Drapeau and Wells note that social software has the capability to unlock self-organizing capabilities within the government, promote networking and collaboration with groups outside of the government, and speed decision making (Drapeau & Wells, 2009). These are all tasks that FEMA seeks to accomplish with the Whole of Community.

Van Leuven presents a compelling example of the 2007 Southern California wildfires, which shows how members of the public will find ways to gather, share, and coordinate information flow amongst themselves, and that they are willing to participate in an information exchange with the media, the government, and the homeland security community as a whole (2009). This supports Rheingold's (1993) theory and has positive implications towards the application of Web 2.0 technologies to engage the Whole of Community. While Van Leuven and Rheingold's research clearly highlights the need and potential benefits for integrating Web 2.0 into homeland security communications and operations, it does not provide many examples and certainly does not aggregate the applications that have been occurring across the homeland security enterprise. Drapeau and Wells (2009) do provide a more thorough overview but do not provide details on individual applications and do not include current applications.

A current review of 2011 homeland security applications reveals that the majority of them center on social software, and in particular social media (SM), crowdsourcing, and mashup applications. In the public sector, these software are being used to create online communities, maintain contact with family and friends, conduct business, and a wealth of other applications. It is not evident from the literature, however, the extent to which these applications are building communities within homeland security. Current

literature akin to Drapeau and Wells (2009) assessment that discuss the aggregate of 2011/2012 Web 2.0 applications and benefits in homeland security is non-existent. Drapeau and Wells work does, however, provide a great framework for understanding the realm of social software applications being used, and it gives insight into both the benefits and dangers inherent in them. This will be revisited during the recommendations chapter of this thesis.

E. FEMA POLICY AND STRATEGY

FEMA's policy for Web 2.0 usage is derived from the DHS policy explained within the DHS social media attachment to the sensitive systems handbook. This policy limits employee's use of social media to personal use on personal equipment (Department of Homeland Security [DHS], 2011a). Official use of social media, per this policy, must be approved by the DHS Office of Public Affairs (OPA) as well as the DHS Office of Privacy (DHS, 2011a). All social media Websites and content on those sites has to be approved by DHS OPA prior to posting; this inhibits real-time interactions via this medium. To further complicate matters, as new technologies evolve, this policy calls for a privacy threshold analysis (PTA) to be conducted, for each initiative, to ensure compliance with privacy concerns before any social media or related interactions can occur (DHS, 2011a). The research did not reveal how long the approval process is for having a PTA completed or for getting DHS OPA approval of content. These policies, however, exacerbate an already delayed system of communications and serve as a significant inhibitor for Web 2.0 implementation.

The four initiatives of FEMA's 2011–2014 *Strategic Plan* are to:

1. Foster a Whole Community Approach to Emergency Management Nationally;
2. Build the Nation's Capacity to stabilize and recover from a Catastrophic Event;
3. Build the Unity of Effort Build and Common Strategic Understanding Among the Emergency Management Team; and
4. Enhance FEMA's Ability to Learn and Innovate as an Organization. (FEMA, 2011a)

These initiatives clearly indicate a need for collaboration, shared situational awareness, and development of a common operational picture. As an example, the desired outcome of the “Nations Capacity to stabilize and recover from a Catastrophic Event” initiative, is to achieve stabilization within the first 72 hours of an event (FEMA, 2011a). Stabilization is further framed by the core capability of enabling a response, which among other things includes situational assessment, public messaging, and critical communications (FEMA, 2011a). Situational assessment indicates that there will be more than just the push and pull of information, and stabilization requires collaboration and a shared situational awareness throughout the Whole of Community. Engaging them is extremely difficult without a comprehensive Web 2.0 policy that facilitates the needed discourse, information sharing, and collaboration. The fourth initiative leaves room for development of Web technology as its goal is learning how to innovate as an agency. FEMA (2011b) *Response Directorate’s Strategic Plan* further refines the overall agency plan and adds another layer of specificity. Goal 5.7(b)(1) requires the staff to use existing systems, or to identify systems necessary to provide a FEMA-wide common operating picture (FEMA, 2011b). The reference to systems creates the opportunity for the development of Web 2.0 solutions to enhance this collaboration and information sharing.

Unfortunately, most of FEMA follows DHS and most of its components, which view the common operating picture literally as a section of the Homeland Security Information Network (HSIN). The HSIN is a system upon which homeland security professionals are expected to engage each other, share information, and develop a shared situational awareness about an event. Web 2.0 applications are included within HSIN, like Jabber (a social media chat functionality), but users are not trained on them and do not use them. Most of the Whole of Community (e.g., state, local, private sector, public, non-government) does not have access to HSIN and are already mandated through their organizations to utilize other systems. These systems, Web EOC, VIPER, Virtual Alabama, traditional social media, etc. are not synced with HSIN, so collaboration and engagement with the Whole of Community remains lacking. HSIN and the common operating picture are reduced to static displays of situation reports and other materials.

This leads to FEMA Directive 262-3, the FEMA *Web 2.0 Policy*. This policy is intended to make FEMA a more participatory and collaborative agency through both internal and external communications and collaboration (FEMA, 2010c). The authorities and restrictions in the policy, however, limit interaction with applications external to FEMA's Office of External Affairs (EA). All other employees are prohibited from any uses outside of personal use on personal time. Official activities are limited to pushing and pulling information without any engagement, dialogue, or collaboration with the Whole of Community. Throughout this policy, there are no discussions on how an employee, office, program, etc. is expected to use Web 2.0 in order to engage in communication with stakeholders, internal communications, or collaboration. Under this guidance, use of social media is limited to monitoring ongoing conversations and attempting to interpret meaning/gain understanding to enhance the individual's situational awareness vicariously through other's posts (FEMA, 2010c). The guidance recommends Google Real-Time search, Twitter Search and Advanced Search, Social Mention, Twazzup, TrendsMap, and TweetGrid and provides very brief tutorials on how to use these tools in order to search and monitor ongoing conversations, posts, etc (FEMA, 2010c). While any shared situational awareness that develops via the collaboration online can be viewed, these are often arbitrary groups, not teams, and their sharing of information is not based on interdependency or necessarily any shared goals. There is no real engagement with any segment of the Whole of Community and, therefore, no collaboration or shared situational awareness for this team.

F. CONCLUSIONS

A review of the literature indicates that shared situational awareness is a product of collaboration within a team and evolves from the team's interaction and dialogue. The core concepts of Web 2.0 in its ability to harness collective intelligence and increase in value as it is used would indicate that it would be useful in homeland security applications towards developing shared situational awareness. The literature recommends Web tools as enablers of dialogue, useful in setting the stage for collaboration, and creating a synergy that can transform organizations. While an exhaustive review of current homeland security applications is not evident, current uses

appear to center around social media, crowdsourcing, and mashup applications. Current homeland security applications, however, do not appear to be benefiting from the collaborations inherent in these technologies, but are rather using them push and pull information. The literature indicates that the composition of the group and the interaction of a group matters in the sense that shared situational awareness is not just about getting the most information, but getting the right information and ensuring all relevant segments of the population are included as it relates to the decisions and actions that need to be taken. Current DHS and FEMA policies and strategy are not taking full advantage of Web 2.0 technologies to facilitate the needed collaboration of the Whole of Community. This would indicate that any shared situational awareness DHS and FEMA develop may be fragmented and incomplete.

III. METHODOLOGY

A. SUMMARY

Two methods were applied to the research for this thesis; comparative case analysis and appreciative inquiry. The comparative case analysis used a collective hermeneutic analytic framework to evaluate collaborative processes within the cases. A four-step appreciative inquiry process was used to evaluate FEMA as an organization in the context of further developing shared situational awareness within the Whole of Community via a Web 2.0 strategy.

1. Comparative Case Analysis

Two cases were reviewed that appeared to represent successful implementations of Web 2.0. The cases were chosen based on criteria discussed in the sample/data collection section. The collective hermeneutic was chosen as a framework for evaluating the collaboration activities within the cases because collective hermeneutics captures the process of how a group of people collectively derives meaning. It was a way of understanding the collaboration processes implemented within the cases to develop shared situational awareness. Information obtained from the cases was evaluated for applicability to FEMA and the problem set of enhancing collaboration to produce shared situational awareness and a common operating picture within the Whole of Community. Recommendations for strategy improvements were developed from these cases and applied via the four-step appreciative inquiry process.

2. Appreciative Inquiry

Appreciative inquiry was chosen because it is a process of identifying positive attributes in a system and looking for ways to replicate them (Whitney & Cooperrider, 2003). It is a capacity building approach that transforms systems toward a shared image of their best potential (Barrett & Fry, 2005). Appreciative inquiry was also chosen to address anticipated resistance to this research within FEMA and the broader homeland security enterprise. As Barrett and Fry (2005) indicate, traditional change management

approaches set up a “Decide-Advocate-Defend (DAD) cycle” where leadership considers new information and once leaders have decided on an action, they advocate their position with little room for questioning. In this structure, both sides of the debate argues for their position and, in defense of their opinion, spends all of their time trying to anticipate the other sides’ arguments and how they can outwit them, as opposed to engaging in a dialogue and asking questions that facilitate learning. In this sense, a lot of FEMA and DHS as a whole has “decided” or made up their mind as to the usefulness of Web 2.0 and its applicability in various segments of their organization.

Other problems are discussed by authors such as Van Leuven (2009) who documents a lack of resources, lack of trust, unfamiliarity with technology, and information overload as causes for Web 2.0 resistance. Drapeau and Wells (2009) add information assurance, bureaucracy, and budget restraints to this list. Brunelle (2010) discusses how this is exacerbated within the pre-disaster or steady state environment. By framing the argument from a positive attributes perspective and focusing on a potential improved future, this thesis hopes to inspire learning and create agents of change while avoiding confrontations and polarized debates.

B. SAMPLE/DATA COLLECTION

The data for this research was compiled from multiple sources including agency Websites, blogs, microblogs, discussion forums, and gray literature such as congressional papers, journals, prior thesis, etc. Conversations with practitioners that have occurred during the normal process of the author’s work were used as well under the following conditions:

1. Only statements of facts gained from conversations were used. Any opinions used came from publically accessible sources such as blogs, Websites, etc.
2. Titles and positions were used in order to provide anonymity for the sources. The titles and positions do not have any significance other than the fact that these individuals were a part of the organizations about which they were stating facts.

1. Comparative Case Analysis

Successful implementations of Web 2.0 were selected from both within and outside of homeland security. The cases were selected based upon four criteria:

1. Evidence of collaboration within the communities involved.
2. Evidence of a state of shared situational awareness and some improved capacity achieved as a result of the collaboration.
3. Relevance to either FEMA as an organization or the challenges discussed in bringing together the Whole of Community.
4. The application of different types of technology. As the literature review highlights, there are multiple types of Web 2.0 technology available, and different types have the ability to facilitate a collaborative capacity. Both FEMA and the Whole of Community are currently using a myriad of applications for different reasons. In order to recommend a more comprehensive strategy and in an attempt to engage the community within the environments where they have already shown some comfort and aptitude, it is important to review cases of different successful applications and not just focus on one like social software.

Two case studies were chosen because they appeared to meet all four criteria:

1. The Transportation Security Administration's (TSA) Idea Factory
2. Ushahidi

a. The Transportation Security Administration's (TSA) Idea Factory

Idea Factory is a Web-based tool that was used to enable collaboration between employees of TSA and their leadership. In the case, there appeared to be a shared situational awareness achieved through the ideas generation process and the resultant projects indicated that an improved capacity was realized for the agency. TSA is very similar to FEMA in that it is one of the 22 components within DHS. Slightly larger than FEMA's 9,000 employees and 12,000 reservists, TSA is comprised of 50,000 Transportation Security Officers (TSO) scattered across 450 airports nationwide (Transportation Security Administration [TSA], 2011). Idea Factory was deployed to address the need to connect this geographically distanced workforce with their Headquarters Office in Washington, D.C.

In a similar fashion, FEMA's workforce is distributed throughout 10 FEMA regions scattered across the U.S., and needs to connect with each other as well as FEMA's headquarters also located in Washington, D.C. The TSA mission is to "protect the Nation's transportation systems to ensure freedom of movement for people and commerce" (TSA, 2011) FEMA shares in a mission of protection, particularly in regards to the Chemical, Biological, Radiological, and Explosives (CBRNE) branch that employs a great deal of resources towards the protection, response, and recovery issues surrounding CBRNE events. Though not committed to a freedom of movement as a mission, FEMA requires TSA to accomplish this mission in order to move emergency management personnel and resources. From these perspectives they are quite similar agencies facing similar problems. Lastly, Idea Factory integrated multiple Web 2.0 tools as the project sought to mirror the types of technology their employees were already familiar with like Facebook, online blogs, chat functions, and user profiles with auto alerts.

b. Ushahidi

Following the violent Kenyan election, catastrophic earthquakes in Haiti and Japan, and blizzard in Washington, D.C., Ushahidi enabled collaboration on a global scale. The visual maps created in Ushahidi were the result of hundreds to thousands of volunteers working together to understand an incident and create a visual depiction of it. Through the population of the site and use of the site a shared situational awareness was obtained and a comprehensive common operational picture was provided. Each case in which Ushahidi was deployed resulted in improved capabilities of the communities for which it was applied. In trying to organize volunteers and coordinate a federal response, trying to enable collaboration across the Whole of Community, and trying to depict an accurate common operating picture, FEMA has been faced with similar challenges to what Ushahidi has been deployed to solve. Similar to Idea Factory, multiple Web 2.0 technologies were employed in the Ushahidi case. SMS (cell phone texts), Skype, YouTube videos, tweets, blogs, etc. were all combined to enable the collaboration and resultant shared situational awareness achieved through Ushahidi.

2. Appreciative Inquiry

Appreciative inquiry was used as a method to structure the analysis of FEMA and the application of lessons learned from the comparative case studies. Recommendations for the improvement of FEMA's strategy for Web 2.0 were integrated into the applicable phases of appreciative inquiry (discovery, dream, design, and destiny). The discovery phase was derived from conversations and observations that occurred within the normal line of the researcher's work, feedback received via FEMA's blog and Website, guidance received directly from FEMA leadership and FEMA's documentation. The dream phase was represented by Web 2.0 enabled collaboration resulting in shared situational awareness and a common operating picture for the Whole of Community. The dream phase was reviewed as it relates to the guiding documents for FEMA's future, namely *FEMA Pub 1* (2010a) and the *Strategic Plan for 2011–2014* (FEMA, 2011a). The design phase was derived using the second approach to design, generating change initiatives directly from the ideas and visions presented in the dream phase. The destiny phase was derived from the Strategic Foresight Initiative, which was conducted to produce a shared situational awareness of the future of homeland security.

C. DATA ANALYSIS

1. Collective Hermeneutics

Collective hermeneutics was applied as a framework to analyze the comparative case studies. Specifically, it was used to evaluate consistently how collaboration occurred within the cases and how shared situational awareness was developed. Hermeneutics is the science of interpretation that describes how an unfamiliar meaning is made intelligible (Grondin, 1991). The process is often referred to in relation to clergy performing an exegesis of sacred text/scripture.

In their paper for Case Reserve Western University, Hansen and Rennecker (2006) present a process model to explain collective hermeneutics for systems development. Their model illustrates the discursive mechanisms a group uses to interpret meaning surrounding a particular project. In their model, Hansen and Rennecker (2006) used an information systems team to show the process the group used to developing and

validate their interpretations of the project/system being implemented. The shared understanding being sought in this case was the system to be developed, how it would be implemented, and the implications surrounding that. When developing the interpretation, the group made an appeal to the text, submitted clarifying inquiries or performed scenario development. The “text” in Hansen and Rennecker’s (2006) example related to an external representation of issues in the form of power point presentations or HTML pages. The group would “appeal to the text” whenever they needed insight or to guide their interpretation of the system being developed, “You’re saying this but the slide says that...yes but slide x also says this.” In other words, meaning was derived based on the text. The group would ask clarifying inquiries of each other when they encountered unfamiliar terms, topics, etc. and through their discourse, they would come to a shared understanding of that item and how it pertained to the project at hand. A subject matter expert in the group would explain a section with which he or she was familiar. When helpful, the group would develop a scenario to describe/understand a particular topic or issue.

Scenarios in the example were useful in helping the group understand possible impacts of the system they were developing so they could account for them/mitigate the associated risks during the development process. The use of scenarios helped the group to understand the why and how of the system being developed and what it was intended to do or not do. When validating their interpretation, the group assessed how their interpretation matched to a particular context. In other words, multiple interpretations were possible and the validation process was how they assessed how well a particular interpretation worked for a particular context. In an appeal to authority, the group would defer to an established power be it the project manager, supervisor, etc. to set the meaning for the group. With interpretive checking, a member would outline his or her understanding via a question, and the group would discuss the degree to which they agreed or disagreed with this member’s understanding. Through retrospective analysis, the group would use past experiences to better understand the current situation and potential future impacts. By relating the current text/situation to a similar past situation, the group used the consequences of past actions as a guide for the future. The last

mechanism used, which was depicted in the center of Hansen and Rennecker's (2006) model, is the deferral of interpretation. This occurred when the team agreed that a shared meaning of a particular part of the development was lacking, but they agreed to delay the pursuit of that meaning until later on in the process. In these instances, the group agreed that there were barriers to resolving contesting interpretations, but the barriers would not prevent them from moving forward in the near term.

Hansen and Rennecker (2006) cite the work of Gadamer (2004), who suggested that hermeneutic analysis was continual, did not depend on the author or their original audience, but was a productive activity. The collective hermeneutic process in this same sense is continuous. Collective understanding, biases/prejudices change as the group interacts and the differences in understanding that emerge create a need for repeated exploration (Hansen & Rennecker, 2006). The roles of each mechanism can become blurred where an appeal to authority could be used to develop an interpretation or a reference to the text could be used to validate interpretations (i.e., help settle a debate). Hansen and Rennecker (2006) cite Cook and Brown (1999) who describe the movement of a group within the hermeneutic circle as a "generative dance" between guessing and validating. Hansen and Rennecker admit the limitations of this process model in that it is subject to a double hermeneutic (Hansen and Rennecker's attempt to derive meaning from how a group appeared to be deriving meaning), it is an initial attempt at exploratory research, and was developed based on a relatively small sample size (five data collection episodes and 39 interpretive episodes). That said, this process provides an excellent foundation for analyzing the interpretive episodes in the cases as this thesis seeks to understand how collaboration develops shared situational awareness.

Hansen and Rennecker (2006) discuss how the project team represents a single community with a common initiative that is comprised of representatives from multiple communities. This applies to the Whole of Community in that it is comprised of multiple disciplines united around a common initiative of response or recovery or preparedness or resilience. It is within these contexts that the community seeks shared situational awareness and a common operating picture from which to take action and make decisions. Hansen and Rennecker also suggest that virtual workspaces, wiki's, and other

web-based collaborative methods hold significant promise for enhancing the collective hermeneutic process. The cases analyzed in this thesis represent web-based solutions that illustrate this point. In the analysis section, a double hermeneutic is applied, in a similar fashion to Hansen and Rennecker's research, as their model is used to understand how the interactions within the case helped to establish shared understanding. The researcher for this thesis interpreted meaning from how the groups interpreted meaning in the comparative cases.

With a better understanding of how and why the comparative cases were successful, the findings chapter of this thesis identified which of the elements of success were applicable to FEMA and how they might be used in the design phase of an appreciative inquiry process for FEMA. Finally, the recommendations chapter of the thesis proposed actions, projects, etc. to adjust FEMA's strategy in such a way that the articulated dream state might be realized.

2. Appreciative Inquiry

Appreciative inquiry is broken down into four phases referred to as the "4 D's" (Barrett, 2005). In the discovery phase, the organization asks questions to come to an understanding on what the best aspects of the organization are in its current state. They highlight what the organization does efficiently and effectively (i.e., when they are at their best). In the dream phase, the organization seeks to frame the ideal future state. Questions are asked to paint a picture of the potential organization it could become. In this phase, the organization creates a shared vision of its desired future state. The design phase is a phase of construction where the organization begins to structure what elements are needed in order to facilitate the activities needed to transform the organization into its desired future state. Ideas generated in the discovery and dream phrase indicate potential policies and strategies that will enable a collaborative capacity. Dreams and ideas are converted into actions and projects that might make them a reality.

Barrett and Fry list two approaches to accomplishing the design work (2005). In the first, structural mechanisms are considered that can guide or shape action. An organizational model might be used to understand how to shape the desired future state.

In the second approach, the organization generates the change initiatives directly from the ideas and visions in dream phase. In either approach, a provocative proposition or an aspiration statement is crafted to capture the spirit of the desired organization. This proposition or statement is used as a motivational tool to inspire the collaborative work needed to accomplish the desired state. The destiny phase is where the organization performs action planning, scenario building, and role allocation to lay out the next steps needed (Barrett, 2005).

THIS PAGE INTENTIONALLY LEFT BLANK

IV. COMPARATIVE CASE STUDIES

A. TSA—IDEA FACTORY¹

The Transportation Security Administration was faced with a series of issues that are systemic to large government organizations. It needed a way to connect its leadership in Washington, D.C. with a geographically separated work force (50,000 employees dispersed throughout 450 different airports) (TSA, 2011). TSA needed a way to share information throughout the organization on new programs/policies and ongoing projects (TSA, 2010). In addition, it wanted a way to tap into the knowledge of its workforce to find out what was working, what could be improved, and how it could be improved (TSA, 2010). Finally, TSA wanted a forum to facilitate communication between their employees (TSA, 2010). For many organizations, like TSA, telephone, fax, video-conferencing, and email are the only communication means available for employees to share ideas or otherwise communicate. While these mediums facilitate communication, it is difficult to use them for large-scale collaboration across the organization. It takes a long time to disseminate information and receive feedback through all of the parties that need to see/hear a message and provide any input to it.

TSA, like a lot of companies, had a suggestion box where employees write their ideas, problems, complaints, etc. on index cards or agency forms and place them in the box. At the end of the workday or work week, whatever period management has decided, they collect the papers/forms/cards and read them. The managers communicated necessary/good ideas to higher leadership using the same legacy technology. Deciding upon which ideas were worth pursuing presented a challenge often handled by a creating a cross-functional working group in-house to perform some cost benefit analysis, customer/employee surveys, or some other form of evaluation. Another method used was outsourcing or contracting someone external to the company to come in and perform these functions and make recommendations. Regardless of in-house or external, the

¹ Information regarding Idea Factory history and growth came from a Webinar accessible at: <http://www.howto.gov/training/classes/TSA-ideafactory>, TSA's Website www.tsa.gov, and conversations with Idea Factory program staff conducted in the line of work while researching how to improve Web 2.0 use at FEMA's National Watch Center.

overall process of getting ideas submitted and having them evaluated was very costly and time consuming. Consequently, very few ideas were followed up on and very little feedback was provided to employees that submitted ideas, complaints, etc. This caused employees to lose trust in the suggestion box as they were often left with an impression that their ideas were not being heard, did not matter, and/or the leadership was not really interested in fixing problems. This significantly decreased morale, and the chance employees used the suggestion box in the future. To address these issues, TSA designed Idea Factory.

The Idea Factory concept was simple: create a Web-based tool that allowed employees to submit ideas, comment on new concepts, and rate ideas that should be recommended for implementation (TSA, 2011). Through a Web-based tool, employees had immediate access to each other without having to travel or attend a lengthy meetings, teleconferences, etc. They were able to access the system from their computer either at home, if they had a government laptop, or at the office while doing other work. The feedback was automatic in that they did not have to wait for leadership to send them something. They watched online as other employees commented on their ideas, and they saw ratings as to whether others agreed their ideas were worth pursuing for implementation. Moreover, they saw how well their idea(s) rated in comparison to other ideas. The Website was available 24 hours a day and seven days a week, which accommodated for every transportation security officer's schedule and allowed every employee equal access.

The Idea Factory management team provided newsletters that informed employees of new initiatives, programs, and policies. A section of the site allowed employees to design their own searches based on key words, status of an idea, types of ideas that had been submitted, a list of ideas they had contributed towards, etc. A profile tab allowed employees to tailor their experience by establishing a personal signature, entering information about themselves, setting up alerts based on different categories, creating a favorites list, etc. For actual idea generation, the site had a building tool to help employees build and submit ideas. Other employees could then comment on that idea to enhance it. Through the comments, employees would collaborate to inform each

other and clarify the idea so everyone understood it. Leadership was able to view the comments as well and could also provide comments to give clarification, debunk myths, or ask qualifying questions to make sure they understood the ideas being submitted. Employees could rate ideas on a scale of 1–5 as to whether or not it should be implemented and track the ideas to keep abreast of their status/progress.

Idea Factory also allowed leadership to use the site to inform employees of new initiatives and programs, and through the “we ask you” tool program offices could submit challenges. These challenges were essentially TSA headquarters sponsored ideas that program offices were considering and wanted to solicit employee feedback on before proceeding with them. This allowed employees to be a part of the process and to feel like they were a part of the solution. Overall, Idea Factory allowed TSA to open the lines of two-way communication between leadership and employees, facilitate communication between employees, widely disseminate information throughout the organization, and increase the amount and quality of ideas from the field for process improvements and new initiatives. The question is, how well did it work?

After four years of implementation, an average of 100 new users visit the site each week, and TSA receives 300 new ideas each month (TSA, 2010). Approximately 5,000 users visit each month and out of these users, 40 percent of them actively contribute to the ongoing discussions/ideas/etc. (TSA, 2010). TSA has generated 10,700 ideas, 84,000 comments, and 50+ new programs (TSA, 2010). The year TSA launched, it was awarded the Secretary of Homeland Security’s award for Team DHS Excellence. In following years, Idea Factory was featured in the White House’s Open Government Innovations Gallery as a model for employee engagement and the Obama Administration’s open government initiative (White House, 2011). In addition, TSA’s Idea Factory has been awarded a Communications Excellence Gold Award from the Employee Involvement Association, an International Association of Business Communications (IABC) Silver Quill Communications Management/Employee Communications Award of Merit, and an IABC Silver Inkwell Award Communications Plans and Campaigns Award of Merit.

Granted, awards and statistics are nice, but did Idea Factory actually improve communications between employees, between the field and headquarters, and did these communications result in an improved capacity evidenced by improved programs/successful projects, etc.? Yes! In fact, TSA saw marked improvements in its employee recruiting and retention, in employee morale, in security programs, and in training. Ideas generated by Idea Factory lead to a number of innovations. For example, Idea Factory led to a Website that allows employees to swap job locations and experience different areas within TSA (TSA, 2010). It also generated the first national celebration of a diversity day that recognized workforce diversity (TSA, 2010). Idea Factory can also be credited with the improved terminology for a public facing site with regard to TSA policy for infants/toddlers and for creating a training module for x-ray operators to help better identify threats in carry-on items (TSA, 2010). These few representative examples indicate Idea Factory not only opened lines of communication, but it created an environment that encouraged collaboration and empowered employees to initiate innovation. The users were not just submitting ideas, but they worked with like-minded employees to build actual solutions to problems. Comments from the employees about Idea Factory included, “I feel empowered to improve my job,” “...gives me a look at the big picture,” “it keeps me up to date on current happenings” (TSA, 2011). TSA has realized work life improvements, more efficient operations, improved training, and enhance security procedures in airports.

In this thesis, the analysis section shows why Idea Factory was so successful, the findings section describes how it applies to FEMA, and the recommendations chapter proposes how FEMA might incorporate these findings into their current strategy.

B. USHAHIDI²

Protests, riots, killings, and other violence erupted following the December 2007 announcement of Mwai Kibaki as the winner of the election in Kenya³. The country entered into a humanitarian crisis: over 1,000 deaths, 300,000 displaced people, and a loss of approximately 1.5 billion dollars occurred in just two months, as reported in February 2008 (Crisis Group, 2008). Years-old ethnic clashes resumed as the ethnically-rooted Orange Democratic Movement and the Party of National Unity fought to gain control. Communities were divided, as longstanding land conflicts, racial and class wars were at the center of the issues surrounding Kenya's violent history.

Gaining accurate information in the midst of this turmoil was almost impossible as media blackouts, government intimidation, misinformation, and a lack of access were commonplace events (Geel, 2010). In an attempt to gain situational awareness, and to give the public a voice, a group of journalists, bloggers and technologists came together and created Ushahidi. The Ushahidi platform, whose name means “testimony” in Swahili, was formed to do just that—allow people to tell their story (Ushahidi, 2012). At the time the plan was simple enough: use the power of the Web to connect people and allow information to flow. Ushahidi was established as an open source platform that was available to anyone that could connect via cell phone, computer, etc. The founders established a short message service (SMS) that allowed people in Kenya to text messages regarding events or information. Volunteers took these texts and aggregated them with other information obtained via email or other web forms, and they geo-coded the information obtained into a visual map.

As more and more people contributed information, however, the crowd began to correct itself and a more holistic view of the events surrounding the elections formed. What emerged was a common operational picture created by the shared situational

² The information for Ushahidi came from their Website: www.usahidi.com, blog posts, and multiple YouTube video interviews of their members and founders.

³ Extensive details of the situation in Kenya including history of violence, assessment of 2007–2008 election/violence, and recommended improvements for the future are included in the International Crisis Group paper available at: http://www.crisisgroup.org/~media/Files/africa/horn-of-africa/kenya/137_kenya_in_crisis_web.pdf.

awareness of the crowd. Information from the ground up countered misinformation from the government and filled in the gaps where the government attempted to withhold information (Geel, 2010). Ushahidi allowed people to track the crisis as the Kenyan national dialogue and reconciliation efforts sought to bring peace to political unrest. Resolution of the unrest involved the work of the United Nations, African Union, and delegates from the United States, Norway, Sweden, and throughout the world. Similarly, the creation and evolution of Ushahidi was the result of several, geographically dispersed, volunteers collaborating, and making it a success.

Fast-forward three years, and a magnitude 7.0 earthquake rocks Haiti. Similar to the elections in Kenya, communications following this catastrophic disaster were next to impossible. Getting information out and receiving information was a challenge for both first responders and citizens. Many of the survivors of the earthquake were trapped in areas that did not exist on a map. The highly vulnerable populations of Haiti lived in slums, which did not have a great infrastructure before the earthquake. Phone lines were down, and search and rescue teams had no way of knowing who was trapped where. The United States Agency for International Development (USAID) categorized the Haiti earthquake as the largest urban disaster in modern history (USAID, 2012). It estimated three million people were affected by the devastation and the over 10 million cubic meters of debris it created.

Enter Ushahidi once again. Over 300 volunteers joined forces and began geo-locating information obtained from social media and cell phone texts (SMS). These volunteers essentially created a map where none existed and guided search and rescue operations as well as other disaster response operations. Patrick Meier relates a poignant example of just how powerful the network formed through Ushahidi was, in an interview he gave during the Where 2.0. Conference in 2010 (Oreilly, 2010). Patrick talks about Eric Rasmussen and Anna Shultz, who were on the ground in Haiti and used Ushahidi to obtain GPS coordinates for trapped survivors (Oreilly, 2010). The survivors were able to communicate by sending text messages from their phones (Oreilly, 2010). Eric and Anna would then use the wisdom of the crowd to get enough information to determine the GPS coordinates for where the survivors were trapped and provided that information to search

and rescue teams (Oreilly, 2010). In the instance Patrick refers to in his interview, Eric and Anna received a text of people trapped in Un Bon Prix near the Napley Hotel (Oreilly, 2010). After several posts from volunteers around the world, Eric and Anna were connected to a man in Brooklyn, New York who used to live in Haiti and worked at Un Bon Prix. After talking to him, they found out that Un Bon Prix as a bookstore in Port Au Prince, Haiti (Oreilly, 2010). Eric and Anna were then able to determine the GPS location and relayed that information to the search and rescue teams (Oreilly, 2010). In a similar fashion, Ushahidi enabled countless rescues and deliveries of crucial medicine and other supplies to areas in need.

The success of Ushahidi did not stop there; however, but it continued to evolve and improve. In 2010, when a blizzard covered Washington, D.C. in record snowfall, the creators of Ushahidi formed “Snowmageddon—The Clean-up” to track street clean ups and provide a way for volunteers to collaborate assistance (Buskirk, 2010). People willing to help found out who in their area could use assistance and, likewise, people needing assistance were able to put out a call for help.

THIS PAGE INTENTIONALLY LEFT BLANK

V. ANALYSIS

A. COMPARATIVE CASE STUDY ANALYSIS

1. TSA—IDEA Factory ANALYSIS

In Idea Factory, the referential text that lies at the center of the dialect is the ideas. People begin to collaborate as they come to a shared understanding as to what the idea means and create a shared understanding of what the implementation of it might mean for TSA. Conversations between employees occurred in the virtual space of Idea Factory. The individual comments, posts, queries, etc. from Idea Factory were not available for the purposes of analysis. The structure of Idea Factory, however, and the results available through the TSA Website, provide great insight into how the process was facilitated by the technology and have positive implications for FEMA. The groups applied an appeal to the text mechanism whenever they referred to verbiage in the posted idea to clarify what it meant. Subject matter experts in either the idea submitter or someone from their program would respond to clarifying inquiries. In the Idea Factory environment, all of these conversations could be viewed by everyone within the community so it was as if they were occurring in a conversation that would happen in a traditional meeting. Scenarios could be used in these comments as well to explain potential impacts or risks that the submitter or others in the group could respond to. Through this discourse, all of TSA that participated would develop their understanding of an idea and rate it.

Similarly, the project team assigned to implement it utilized the tools within Idea Factory to collaborate and understand what they were developing. TSA HQ leadership participated in the discussions and acted as the authority whenever an appeal to authority mechanism was used. The site supported interpretive checking and retrospective analysis of past ideas/efforts and situations that illustrated the need for the new idea/project to be implemented. Any disagreements could be easily deferred in the rating phase, depending on whether or not the idea was chosen for implementation. In the implementation phase, interpretations could again be deferred until they had to be resolved to move forward. In

these instances, appeal to the text, appeal to authority mechanisms would apply in TSA leadership as well as Idea Factory program manager involvement providing amplifying information and guidance. Their continued success is a result of a structure, a strategy, and maintenance.

The landing page (where people start when they first go to the Idea Factory site), the way in which employees interact with the site, and the way the site is designed was all done to capitalize on Web 2.0 applications that the employees use on a personal basis. These are applications that are already familiar to them so using Idea Factory would feel familiar to them as well. This provided multiple benefits from the company perspective in that they did not have to set up an exhaustive training plan or spend a lot of money on developing intensive training documentation. The site was intuitive to users that had used Facebook, LinkedIn, or other popular social software. For those who had not, it was easy to figure out how to use the site because it was user friendly. Buttons, tabs, pull down boxes, etc. were designed to mimic similar items that employees would have experienced/used in Microsoft word applications, windows applications, etc. This overcame the lack of training and unfamiliarity with technology resistances that Drapeau and Wells (2009) and Van Leuven (2009) site as common barriers to using Web 2.0 applications. As the shared understanding was achieved, employees were better situated to vote on which ideas were best suited for being transformed into actual projects for implementation. Once the ideas have been chosen for implementation, the collaboration continues through the project teams assigned to implement them. This is the point where the collaboration leads to increased capacity as people build the innovations suggested in the ideas.

The hermeneutics process continues as the projects are completed. Team members develop their understanding of what they are building by checking against the text, asking clarifying inquiries, and using scenarios to understand potential impacts of the projects being implemented. Furthermore, they can appeal to authority of TSA leadership conduct interpretive checking and perform retrospective analysis via past projects. Idea Factory enables all of this collaboration by creating a safe, comfortable, virtual world for the employees to work in. But it is not just the environment/technology

that makes all of this possible. There are structural aspects to how TSA implemented and maintained Idea Factory that were also critical to its success.

The leaders of TSA created a culture of collaboration within their agency as evidenced within TSA core values. Within TSA's core values, it lists innovation and states, "We are people with an enterprising spirit, striving for innovations, who accept the risks that come with it" (TSA, 2011). There are a few words within this statement that are significant in creating a culture of collaboration marked by the sharing of ideas to bring about innovation and enhance learning. In stating that "we are people" with enterprising spirits, TSA shows that as an organization it embraces new enterprise meaning new ideas. This encourages employees to share their ideas with confidence that leadership will listen. It lets TSA employees know that they can make a difference. The value statement says that TSA strives for innovations, which indicates a forward momentum. TSA employees are not just looking to entertain or compare what is already out there, but they are striving to create it themselves. In other words, they are willing to work to achieve innovation. Lastly, by stating they are willing to accept risks, TSA leadership empowers its employees to take risks. This statement implies that leadership is willing to accept the failures that go along with trying new concepts and ideas, willing to expend the finances necessary to research and test new innovations and willing to allow their employees to try. The question that arises is whether or not the organization and the leadership of the organization, in particular, supports this statement in practice. The fact that Idea Factory was created and continues to thrive with new ideas, new solutions to problems and sustained collaboration indicates that at least in some ways they do practice what they preach.

In the maintenance and operation of Idea Factory, the program team reinforces the facts that employee opinions are counted and that innovation is valued in TSA. The program team sends out surveys throughout the workforce to confirm what people like, what people would like to see changed, any issues, problems, or concerns users have with Idea Factory. As they receive feedback, the program team implements recommended changes so the employees see their ideas come to fruition making them feel even more a part of the team and encouraging them to continue to look for ways to improve both Idea

Factory and TSA as a whole. News releases are issued on Idea Factory that keep employees informed of new programs, initiatives, policies, clarifying confusing issues, etc. Employees are able to get a sense of the latest happenings in the organization quickly and can get more information on programs or initiatives they want to get more information about.

In launching Idea Factory, the program team did initial how to training to get employees familiar with the new program. Through this training, employees saw that the program was similar to Web 2.0 technology that they were already familiar with like Facebook and LinkedIn. They launched the technology through pilot programs to get initial feedback on what worked and did not work, and they built up a buzz/interest in the program through internal news releases. It was essentially marketed throughout TSA so that employees were looking forward to it by the time it was fully implemented as opposed to hesitant, confused, and resistant to engage with it. There was TSA leadership support indicated in the news releases, which indicated that this was not just another fad program that would quickly go away but something that was going to be supported and used.

2. USHAHIDI ANALYSIS

Ushahidi is very different from traditional software development in that the design process is anywhere from a matter of hours to a matter of days. The platform is launched for a disaster in which time is of the essence for accurate information to get to first responders in time to save lives. Thousands of volunteers interpret meaning as the platform is being used, and the platform is continuously improved based upon the shared understanding of what users need. The collective hermeneutics process for this application is hard to track because many of the events are happening simultaneously. The “conversations” in which the team derives meaning occur via chat room discussions, skype calls, blogs, emails, etc. That said, the model still provides insight into how collaboration leads shared situation awareness and permits the volunteers to interpret meaning.

The context for Ushahidi can be seen from the perspective of the volunteers who design the platform and perform the functions of geo-coding information. Their context is a visual representation of an event. In essence, they are telling the story of the event that can be referenced by category, chronologically, or as needed by the user. Their audience includes both survivors of disasters and first responders. The way in which the event is categorized and the way in which information is represented is continuously updated by the crowd of volunteers. They appeal to the text by referring to the map/platform and questioning if it tells the story and, if not, how can they improve it. Clarifying inquiries are presented to the group at large and answered by those with expertise in that particular area. The power of open source platforms is that if no one with a particular expertise/skill is currently part of the group, it is relatively quick and easy to find someone who has it and bring them into the group temporarily to answer a question. Scenarios are used in conversations between design engineers as they build out or improve sections of the platform. The appeal to authority in this case is made to the owners/creators of Ushahidi as well as the creators of the platform for a specific event.

Following the magnitude 9.0 earthquake in Japan, for example, Open Street Map was the authority as they launched their application on a Ushahidi platform (Oreilly, 2011). Validation of the site is evident in how well users are able to gain information/use it. Volunteers constantly check their interpretation against other volunteers and then each modifies their work based on the resultant understanding. Retrospective analysis is applied by referring back to past iterations of Ushahidi. The platform is iterative in that each time it is employed it is tailored to match a particular situation/disaster and improved. The coding improves, the collaboration improves, and the end product is improved. To get a sense for the progression, when Ushahidi was initially deployed in the 2007 Kenyan elections, they mapped a total of 3,000 reports, and, four years later following the 2011 earthquake in Japan, they mapped approximately 3,000 reports per day (Oreilly, 2011).

Success of the site can be seen in how it continues to evolve. For example, there is now a task force called @standbytaskforce.com that consists of over 500 professionals ready to assist in times of crisis. These professionals are skilled in mapping and other

aspects of technology and have indicated that they have a desire to help when catastrophe strikes. Through this group, these volunteers are sharing the latest and greatest developments in regards to crisis mapping. They provide training to other volunteers that are interested in learning and thereby increasing and developing their pool of talent. A large reason for the success of Ushahidi is talent.

The founders of Ushahidi are PhD candidates at the Fletcher School at Tufts University. The university has taken over Ushahidi-Haiti and is now moving it to another level in which they are partnering with the Haitian Diaspora to help hold the development community accountable as the country is rebuilt (Ushahidi, 2010). Ushahidi allows for citizens to track the rebuild and recovery in order to see trends. The desire of these volunteers is altruistic in that their goal is for Ushahidi-Haiti to become a fully Haitian owned and managed project giving Haitians a power they did not possess before the earthquake. The crew at Tufts is going beyond that task as well in order to train other universities on how they can develop crisis mapping capabilities and skills.

Several YouTube videos are available of conferences Patrick Meier and Ory Okolloh and other influential Ushahidi members have attended, as well as interviews in which they have participated. These creators are interested on continually improving on what they started and providing it as open source software that anyone can improve with the skill and desire to do so. As Patrick stated, Ushahidi enables a two-way communication between survivors and first responders via volunteers (Oreilly, 2010). This technology is essentially connecting the Whole of Community and enabling every day citizens to help each other. As Katie Jacobs Stanton from the U.S. State Department stated in her interview with the Oreilly Media, “Ordinary people used technology to do an extra-ordinary thing” (Oreilly, 2010).

B. APPRECIATIVE INQUIRY ANALYSIS

1. FEMA’s Discovery Phase Analysis

FEMA’s mission is to support citizens and first responders and work together with the national emergency management team to improve the capability to prepare for, protect against, respond to, recover from, and mitigate all hazards. At its best, FEMA

improves the nation's capability to achieve emergency management outcomes. It is a service agency, which is echoed in FEMA's ethos "serving the Nation by helping its people and first responders, especially when they are most in need" (FEMA, 2010a). In FEMA's (2011a) *Strategic Plan*, FEMA leadership established five priorities to address current and future challenges: Strengthen the nation's resilience, build a unity of effort, effectively support disaster survivors, and address the most significant risk. Collaboration across the Whole of Community and a shared situational awareness are necessary to address all five of these priorities successfully. Resilience, as an example, represents what Moghaddam (2010) calls a superordinate problem (i.e., one that is solved only through the work of a collective). This is a problem based on interdependency, where stakeholders have a common goal, which the literature review indicated increases the chance for successful collaboration. Based on personal observations and the principles revealed through the research, FEMA has several current practices that are representative of where FEMA is efficient and at its best. They greatly improve situational awareness, encourage collaboration, and can lead to a shared situational awareness within segments of the Whole of Community. The practices are listed here to indicate their relevance to the discovery phase. Recommendations for how to enhance them based on findings from the comparative case analysis are included in the findings and recommendations section.

2. Practices To Be Continued

a. Monitoring of Social Media In National And Regional Watch Centers

This is a practice that allows the members of the watch centers to keep abreast of trends and get early warning signs as events evolve. Trending, in other words an increase in conversations, around key topics such as power outages, hurricanes, earthquakes, etc., serve as triggers to investigate and correlate information on an event. This gives watch standers a head start on information collection and can lead to advanced warning of impending events.

b. Adobe Connect

FEMA currently uses Adobe Connect to conduct its 8:30 a.m. daily morning briefings. This Web solution allows the national watch center to broadcast highlights about events that FEMA Headquarters may be following and/or responding to. Through Adobe Connect, users are able to view slides, listen via conference call, and ask questions/have discussions. This collaboration tool has been a great success at FEMA and was incorporated as a means to share information and increase awareness.

c. Go-To-Meeting

Similar to Adobe Connect, NOAA's National Weather Service uses go-to-meeting to update FEMA regions and state partners about forecasted severe weather events. Through go-to meeting, the weather service shows the forecasts on a graphical map where users can bring up different layers to aid the conversation such as population densities, major cities, and other information. The meeting is conducted via a conference call in which participants essentially undergo a collective hermeneutic and develop a shared understanding of the impending storm and potential impacts. Preparedness activities are sometimes coordinated on these calls, or they lead to future planning teleconferences to iron out details of preparations for response, identification of anticipated shortfalls, etc. State and local partners combine with national/federal partners to develop shared situational awareness.

d. External Affairs Use Of Social Media

FEMA External Affairs has the most experience with using Web 2.0 to push FEMA messages out to the public. The office has incorporated mobile phone applications, developed the FEMA Facebook Page, FEMA Blog, and maintain FEMA's disaster information links to other important disaster information such as the Red Cross and the Small Business Administration.

3. FEMA's Dream Phase Analysis

In 2010, FEMA conducted a self-assessment and created FEMA *Pub 1* and the *Strategic Plan for 2011–2014*. FEMA's dream state is presented in these documents. On

FEMA's blog, it states that FEMA *Pub 1* represents the agency's principles and culture and serves as the context for the implementation of the strategic plan, which is the "guiding document for the agency as they look to future of emergency management" (Kaufman, 2011). The Administrator of FEMA states, "Pub 1 communicates who and what FEMA is, what we do, and how we can better accomplish our missions" (FEMA, 2010a). The document presents guiding principles that embody FEMA's core values, apply across all mission areas of FEMA, and are intended to guide action to ensure FEMA is performing at its best. These principles will be reviewed in the recommendations and findings section with recommended actions based on the comparative case analysis.

4. FEMA's Design Phase Analysis

This thesis applies Barrett and Fry's (2005) second approach to the design phase by generating the change initiatives directly from the ideas and visions presented in the dream phase. *Pub 1* provides the aspiration statement for FEMA and the Whole of Community in regards to collaboration and achieving a shared situational awareness. In the ethos statement, Pub 1 states, "FEMA's fundamental goal, and the inspiration and motivation for many FEMA employees, is to serve the Nation by helping its people and first responders especially when they are most in need" (FEMA, 2010a). This is qualified in that FEMA has a responsibility to help citizens realize they have the power to help themselves, in essence, empowering them to be a part of the solution. This is further codified in the principles illustrated in the dream phase. The recommendations and findings section presents the actions that need to be taken to make the dream phase a reality.

5. FEMA's Destiny Phase Analysis

In January of 2012, FEMA published the results of the *Strategic Foresight Initiative* (SFI), which was conducted with a goal of creating a common sense of awareness regarding the future (Kaufman, 2012). This initiative looked as far forward as the year 2030 and created a guide by which the Whole of Community might plan for the future (Kaufman, 2012). Through a process of scenario planning, the SFI team identified

the forces of change that will shape the emergency management landscape and addressed strategic needs, capacities, and capabilities that will be needed to be successful in the envisioned landscape. Of the 15 common strategic needs they identified, over half of them relate directly to the issues identified in this thesis. They include:

- Practice omni-directional knowledge sharing,
- Build a shared vision for the emergency management community,
- Establish frameworks that optimize emergency management interoperability across all boundaries,
- Plan and coordinate around shared interests and interdependencies,
- Influence the development of emerging technologies,
- Empower individuals, neighborhoods, and communities to play a greater role throughout all phases of disasters,
- Intensify disaster-response collaboration and planning with Canada and Mexico, and
- Foster increased collaboration to ensure appropriate use of the military. (Kaufman, 2012).

The themes of collaboration, interdependency, and shared situation awareness stretch across each of these needs, which have been identified as critical for addressing the challenges of the future. The *Strategic Foresight Initiative* has paved the way for FEMA's destiny.

VI. FINDINGS AND RECOMMENDATIONS

A. COMPARATIVE CASE ANALYSIS

1. Idea Factory Findings and Recommendations

In the TSA case, the issue being resolved was connecting geographically separated members of the agency. Through Idea Factory, the employees were given a voice and empowered to be a part of improving the organization as a whole. This same concept can be applied within FEMA towards the Whole of Community. The phases of disaster response have historically been organized by function. The *National Response Framework* placed lead agencies over each emergency support function for the coordination of the activities within those functions. Emergency Support Function (ESF) 1, for example, is in charge of all transportation related issues. TSA, the U.S. Coast Guard, Army Corps of Engineers, etc. all coordinate through the Department of Transportation as the lead for ESF-1 (FEMA, 2008). To realize the Whole of Community, however, these government agencies need to be linked to the public and the private sector. A public version of Idea Factory could be launched to allow for anyone interested/skilled in particular areas to submit ideas, vote on ideas, and collaborate around the function of their interest. In the same way TSA launched pilot programs before going live, FEMA could establish pilot programs for its employees. As they get comfortable and improve the program, it could extend this to the ESFs, and then, ultimately, to the public at large. Throughout the process surveys and other methods of getting feedback should be implemented in order match the services provided to the users' needs.

The Idea Factory case shows that success is not immediate/overnight. TSA took time to better understand the need, to market the program before it was launched, and to continuously perform checks to ensure it was being used, well received, etc. FEMA needs to be mindful of this lesson and be willing to take the time to understand the Whole of Community before trying to deploy a new technology. What social media platforms are the Whole of Community currently using? A net assessment similar to the one performed by Drapeau and Wells (2009) should be performed with a focus on the Whole

of Community so the most popular platforms, technology, affordances, etc. can be incorporated into whatever solution is developed. This will ensure that users are familiar with the technology and will overcome resistance to using it.

By the time this thesis is published and an assessment is done, FEMA may find that the technologies and communities are already formed. It may not be as much a need to launch a solution as to ensuring all stakeholders are included in the solutions that are already out there. As the literature showed, collaboration is efficient when there is a willingness to participate, interdependencies of the organizations using it, and trust between members. In the Idea Factory case, TSA instilled trust in employees, used technology they were comfortable with, and constantly provided feedback to encourage future use. FEMA took it a step further in its organization and incorporated the Idea Factory into its core values. Changing the culture of the Whole of Community will be difficult because, unlike the TSA case, the members are not FEMA employees. A first step in accomplishing this task would be to lead the way by example and changing the culture within FEMA.

2. USHAHIDI Findings and Recommendations

The Ushahidi case presents a wealth of information for the Whole of Community in that it occurred within the public sphere. Ushahidi connected disparate partners from around the globe and focused them around a disaster or an issue for which they had shared interest. The challenge of mapping a crisis attracts highly skilled technicians who may be more interested in solving the issue of aggregating mass SMS, MMS, emails, and different social software into one coherent map/picture more than in the survivors. There are volunteers whose interest is purely in helping get aid to those in need, and yet others who are interested in supporting the response agencies. Whatever their interest, they all can unite in the Ushahidi space and contribute their part the whole of disaster assistance facilitated through an open source platform. Ushahidi has refuted the assumptions that the public are victims and not willing or able to participate in disaster response.

In the Haiti case, the Japan earthquake, Snowmageddon, and countless other examples, individual citizens have shown up in mass to assist each other and to be part of

the solution and not the problem. When cell phone towers were down, SMS were up. FEMA and the response/recovery agencies in general were greatly assisted through volunteer services provided by platforms like Ushahidi. This was the most comprehensive and accurate common operational picture available following the Haiti earthquake. The standby volunteer task force includes over 500 people from 50 different countries who are collaborating in a steady state to prepare for the next disaster (Oreilly, 2010). This is a case in which FEMA and the Whole of Community do not need to launch new technology, but rather they need to catch up and get onboard with the solutions that already exist. Ushahidi, and the other similar platforms to it, are connecting the Whole of Community on a global scale.

B. APPRECIATIVE INQUIRY FINDINGS AND RECOMMENDATIONS

1. FEMA's Discovery Phase Findings and Recommendations

FEMA needs to conduct a self-assessment of the agency and the Whole of Community to ascertain what Web 2.0 applications employees and stakeholders are most comfortable with/already using. As seen in the Idea Factory case, the more familiar applications are the more likely users will engage with them. Each of the leadership priorities for FEMA require collaboration to address superordinate problems, so it would behoove FEMA to develop Web solutions that enable this collaboration in a form that is familiar to users. The assessment can be done through a combination of diverse focus groups, surveys, teleconferences, etc.

2. Recommendations For Status Quo Practices

a. Monitoring Of Social Media In National and Regional Watch Centers

Where this practice evolves into collaboration and shared situational awareness is in the correlation of information. As indications, warnings, trends, etc. are noted in open source media the watch centers begin to correlate the information with official/other sources. This currently involves phone calls between watch centers, from the watch centers to the state emergency managers, etc. To improve upon this practice, it is recommended that an official technological solution be incorporated to assist with this

collaboration. For specific events, a crisis mapping tool like Ushahidi or Crisis Commons could be employed. During steady state, pre-disaster time frames official social software similar to GovLoop or FirstResponders.gov could be developed to allow near real-time dialogue between watch centers and other partners. LinkedIn, as an example, allows for private groups to be established. Invitations could be sent out to all applicable stakeholders with a vested interest in social media trends, early indication and warning, etc. These stakeholders would then be able to meet virtually and share their individual awareness of emerging events. Through their collaboration a shared situational awareness would be developed that would aid their decision makers in taking appropriate and timely actions.

b. Adobe Connect

Prior to the use of Adobe Connect, the presentation slides were sent out as a PDF providing only static information. As mentioned, while this increased situational awareness, it did not permit those viewing it the benefit of hearing the conversations that ensued around the presentation or give them the means to provide amplifying information, correct wrong information, or ask clarifying questions. Most segments of the Whole of Community are able to join this briefing, with the exception of the general public/individual citizens. A requirement for an official email, .gov or .mil account prevents some members from participating. As this research has shown, the greater the community and better the diversity within the group the more accurate and valuable the resultant shared information. This would be hard to incorporate into a formal briefing, such as the 0830 am brief. There are security concerns with allowing free and open access, and there are those within society that would have malicious intent.

To combat this, it is recommended that trusted individuals within the Whole of Community be allotted official accounts and allowed to join in the collaboration when needed. It is the interdependency that drives effective collaboration and not everyone needs to be involved if they are not truly stakeholders in resolving issues. Those who do have important and relevant information, however, need to be included in order to obtain the most accurate shared situational awareness and common

operating picture from which to make decisions. Another option would be to have two versions of the morning briefing, a private viewing and a public viewing. To an extent this happens now, in that only trusted partners attend the meeting in person or are provided with speaking pins to participate in the call. The remainder of participants are on listen only lines and viewing via adobe connect. Because Adobe Connect is a more general viewing it could potentially be opened up to a wider audience, and the chat functions would enable a two-way communications to facilitate collaboration. Important information gained could be shared with the larger audience via the national watch center.

c. Go-To-Meeting

Similar to Adobe Connect, go-to-meeting is not an all-inclusive solution. These calls are conducted by invitation only, so only those official partners who traditionally participate are invited. It is recommended that as more of the Whole of Community becomes engaged that they be added to these meetings/calls/etc. Trusted citizens and private sector partners will have a lot to add to understanding the situations in their communities. The focus should remain on interdependency as to when to extend invitations to the group at large. This is a practice that should be scalable and flexible to accommodate all needs within the Whole of Community. The other benefits of including a wider audience are future storms. As the members of the public are better educated as to what to look for, they will provide more accurate and useful information via social media when storms arrive. The benefits of this information are depicted in the Ushahidi case, where the collaboration of volunteers helped to create a common operating picture of events.

In a recent example, in February 2012 a series of tornadoes ripped across the Midwest. Every day citizens were tweeting, posting pictures, etc. as they watched the tornadoes go through their areas. The Weather Channel broadcast the storms as they occurred, and the trends in social media accurately matched the radar pictures and forecasts. People who were not able to watch television that were tied into a social media network via their cell phones were able to receive early warnings when storms were

headed their way. The National Watch Center followed both the Weather Channel and social media and correlated information with FEMA regions in the area, state emergency managers, power companies, the National Weather Service, etc. The resultant shared situational awareness gained was lauded by leadership and allowed the National Watch Center to provide accurate updates to stakeholders. Go-to-meeting sessions that integrate all stakeholders can greatly improve collaboration and resultant shared situational awareness.

d. External Affairs Use Of Social Media

During the course of this thesis, FEMA launched two versions of Idea Scale, to capitalize on the benefits highlighted in TSA Idea Factory. Both of these applications of Idea Scale should be continued and developed. The internal Idea Scale for employees is a very similar tool to Idea Factory. It is an inwards strategy that allows employees to submit ideas, comment on ideas, and vote. The one area that appears to be lacking, at least in the current version, is the level of follow-up evident on TSA Idea Scale. Most of the initial comments appear to involve employees talking to employees without much oversight. It is questionable whether or not an actual maintenance team is continuously monitoring, improving, and maintaining the site. Since its launch in February of 2012, users are starting to question if it is truly the collaboration tool it was billed as, or just another way for employees to vent. Caution should be taken to ensure this powerful tool is not relegated to a virtual complaint box. Its launch did not capitalize on the marketing strategy or on the pilot programs used at TSA. It was actually by coincidence the author found out about the site while researching a related item at FEMA. A better internal messaging strategy, a more formalized maintenance strategy, and a much more hands on approach with active participation from leadership is recommended to make this application a success.

The external Idea Scale represents an outward social media mechanism by which FEMA External Affairs collaborates with the public. Users can submit ideas, comment on ideas, and vote. This has taken the TSA example to another level in that TSA did not have a public facing side to their solution. There is constant External

Affairs monitoring of the comments here and feedback seems to be quicker. Time will tell whether the ideas evolve into actual projects that improve the capacity of the agency or the Whole of Community but it appears to be a great first step towards that end. It is recommended that FEMA External Affairs meet with the TSA Idea Factory team to share best practices that helped to make it a success within TSA, and apply those to this public facing site as well. Customer surveys, continual feedback, and follow-up are initial ones that apply.

3. FEMA's Dream Phase Findings and Recommendations

a. Principle Of Teamwork

Pub 1 states, “emergency management is inherently a collaborative activity” (FEMA, 2010a). This researcher could not have said it better. As the research has shown, Web 2.0 applications can only serve to enhance this collaboration. For this to happen FEMA needs to create a culture of collaboration and it is up to the leadership at FEMA to set the stage. The guiding principles, ethos, etc. are great sentiments but it will take action for this to occur within the Whole of Community. As seen in the TSA example, it was not just having a core value statement, but the follow-up, as seen with leadership on Idea Factory, that solidified the message. FEMA leadership will need to be more responsive on Idea Scale both internally and externally for the message to set in. Leadership by example will guide the formation of teams and the empowerment of individuals to participate. As mentioned, the focus for these teams needs to be centered on interdependencies. Common problems requiring a shared vision and collaboration focused on super ordinate goals.

b. Principle Of Engagement

FEMA needs to reach across the entire spectrum of the Whole of Community to ensure the widest distribution of stakeholders and the most diversity of teams formed. As Drapeau and Wells (2009) suggest, FEMA needs to envision citizens as communities of conversations. Citizens that are interested in being a part of the solution are making themselves known through social media, standby volunteers, and GovLoop being prime examples. Initially, FEMA just needs to get involved and engage

with these groups. By including FEMA subject matter experts and skills in the conversations, FEMA can build a brand of trust in the communities with whom they desire to connect. When new crisis maps and applications become available, FEMA will know about them; OR if FEMA decides to design its own to facilitate collaboration, it will have a medium through which to attract users to its sites.

Drapeau and Wells (2009) recommend strongly supporting social software from the top down, creating a culture of experimentation, empowering individuals to be authentic. Changing the culture of FEMA to one of experimentation is a first step towards encouraging the rest of the Whole of Community to engage. FEMA needs to invest time to assess exactly what segments of the whole of Community are on which social media sites. It also needs to assess what Web solutions are already in place within the public and private sectors that FEMA employees could get trained on and participate in. In order to set the stage for collaboration, FEMA needs to understand the environment they are operating within. Assessments were done by External Affairs on how and where to push messaging, but a separate assessment needs to be done for operational, collaboration, and shared situational awareness purposes. FEMA is in a unique situation in that the Administrator of the organization is an avid user of social media. As seen in the Idea Factory case, support from the top down is crucial in getting buy-in and necessary report.

FEMA's Challenge.gov initiative attempted to encourage engagement but by not following up in a timely fashion, the opposite message was relayed to the public. Comments on the site turned from support to disappointment and left an impression that FEMA did not really care about involving everyone in emergency management and preparedness. The important lesson to take away from that is social media requires constant attention. The members who participate in it are avid users. This can be seen on sites like Yelp where foodies post pictures of every meal they have, reviews of every business they use, etc. The elite members of this site document their entire day via cell phone texts, facebook posts, etc. These are the types of members of the Whole of Community that FEMA will be engaging with, and there needs to be someone on the

FEMA side that is just as avid and just as active or else FEMA will lose the trust and the willingness to participate from those we seek to engage and empower.

c. Principle Of Empowerment

The main goal behind the Whole of Community approach is helping people to help themselves. FEMA's best is represented in its mission to help the nation prepare for, prevent, respond to, recover from, and mitigate all hazards. In catastrophic situations, it will take all aspects of the Whole of Community to be successful towards any of these mission areas. For that to happen, every necessary segment needs to be engaged, and has to feel empowered to act. This is extremely difficult to instill post disaster if it has not been addressed pre-disaster. Through Web 2.0 FEMA can set the stage to re-enforce this. It is recommended that whatever solutions are developed that they be non-punitive. As TSA showed in Idea Factory, a fear of attribution is strong barrier to innovation. FEMA employees and members of the Whole of Community need to feel comfortable in order to participate. Any indication that they are being watched, analyzed, criticized, or could face any criticism, negative impacts of attempting to use technology, sued, etc. will cause Web solutions to fail. The goal needs to be creating a culture of experimentation and innovation, and FEMA needs to be willing to take the risks associated with that if it wants to progress. The dream state for FEMA is one in which there is a perpetual shared situational awareness that is continually updated via collaboration throughout the Whole of Community. At any given moment the national emergency management team can feel the pulse of a situation and make educated decisions. Constant collaboration will also lead to steady improvements in preparedness activities, and other mission area activities. By empowering all stakeholders, FEMA significantly increases the opportunity to improve community and national resilience.

4. FEMA's Design Phase Findings and Recommendations

The actions that need to be taken to make all of the visions in the dream phase a reality is first and foremost FEMA's Web 2.0 policy needs to be updated so that employees are allowed to have professional accounts that they can access during work hours on government issued equipment. The idea that employees are going to do work

on their personal time using their personal account is unrealistic. The research has shown that the opportunities for the employee to socialize with other government officials and learn the latest tools available to increase their productivity and improve their organization are endless. Communities in the public sphere are starting to collaborate around particularly wicked problems that exist within the complex cynefin domain and find solutions to them. FEMA is currently missing out on this phenomenon, but through implementing the recommended changes it can become a part of the solution. LinkedIn, GovLoop, FirstResponder.gov, #SMEM, are all examples of professional social software sites that require employees to have their own unique sign on to participate in them. The professional sites can be an interim solution for FEMA that FEMA's information technology and security personnel might be more comfortable with than Facebook, Twitter, and other commercial software. FEMA has shown it is willing to try new software in their use/application of Idea Scale. This is a good start, but more Web 2.0 solutions need to be included if FEMA is going to aspire to a culture of experimentation and truly build towards a culture of collaboration enabled by Web 2.0.

The example presented by Ushahidi indicates that FEMA needs to develop a mash-up application that can serve as a middle ware and connect the various systems that exist throughout FEMA. Through this application, FEMA can create a common operational picture that encompasses all that is known about a particular event. The application needs to incorporate real-time feeds from sources that update on a regular basis like NOAA weather forecasts, hurricane forecasts, etc. It also needs to have a means for watch standers to update information as they glean it from their listening strategy and follow-up. Furthermore, it needs to have a way for members in the field throughout the Whole of Community to add information of value such as the status of shelters, road conditions, etc. As people interact with the environment, they add to the total picture and enhance the awareness of others. The collaboration enabled by this application will lead to a shared situational awareness for those who participate in the process of collaboration.

FEMA has a unique opportunity in that the current Administrator is an advocate for social media as well as an avid social media user. In part, this explains the emergence

of new and improved uses of Web 2.0 within the agency. This is the opportune time to shape and codify a strategy that will be supported from the top of the organization. FEMA is engaging with the various forms of Web 2.0 (e.g., blogs, facebook page, mashup viewers like SAVER, internal collaboration tools of adobe connect and groove). This is positive in that it is slowly providing employees with familiarity with these tools. They are being used largely to push information out and pull information in, but through minor adjustments in their applications, they could relatively easily be used to engage more of the WOC and foster collaboration outward as well as inward. It is recommended that more applications like the public facing section of Idea Scale be considered. Results from Idea Scale will be telling as to how ready the community is to engage through that forum. It must be taken into account, however, that Idea Scale was not highly advertised, and it comes on the back of Challenge.gov, which was not well received by the community at large. Recommend FEMA continue to improve the FEMA Blog, Idea Scale, and encourage employee participation in ongoing professional dialogue current occurring via social media.

For the watch centers and FEMA employees who are monitoring social media, it is recommended that they develop and train towards a listening strategy. Aggregate sites can be modified so that trusted users, key information, and locations are evident. It is important that for early indication and warning, watch staffs are able to sift through all of the white noise in social media/open sources to find the trends and key information relevant to emergency management. The sooner information is found/received the sooner the watches can begin the correlation activities that initiate collaboration and build shared situational awareness about an event. An effective listening strategy will enhance the collective hermeneutic and allow them to make sense of situations/events more quickly. This will greatly enhance decision-making recommendations and support.

a. Pitfalls

In designing FEMA's strategy, however, there are some pitfalls to avoid. The Department of Homeland Security (DHS) was recently sued by the Electronic Privacy Information Center (EPIC) under the premise that DHS's National Operations

Center (NOC) social media monitoring program was in violation of the Privacy Act. The NOC Media Monitoring program was designed to enhance situational awareness by monitoring social media (DHS, 2011). General Dynamics was hired to run the program, and the issue EPIC took with this program was the implication that DHS was monitoring social networks and media organizations for dissent and criticisms of the agency (Rotenberg, 2012). Epic claimed that there was no legal basis for DHS's program and implied that the program was akin to government spying (Rotenberg, 2012). The DHS policy clearly provides a legal basis for the program under the Homeland Security Act and its charge to maintain situational awareness develop a national common operational picture (DHS, 2012).

This is a vitally important case to be aware of, and it is highly recommended that FEMA watch for the results of the hearing and any decisions that are made. Parts of FEMA's Web 2.0 strategy fall within this program as the shared situational awareness is provided to the NOC in order for it to form the national common operational picture. Public perception of impropriety, government spying, violations of the privacy act, etc. can destroy any attempts to engage, empower, and collaborate with them. It is important that FEMA External Affairs maintain open communications and messaging to ensure the right messages are out in the public to counter negative perceptions. It is equally important that FEMA subject matter experts are available online, present in social media, to engage in dialogue with members of the public who are willing to discuss these issues and perceptions. The literature has shown that the crowd tends to correct itself, but if FEMA is not a part of the crowd they will miss out on a key opportunity to correct damaging perceptions and mis-information. As the Ushahidi example showed, however, successful use of this technology can counter mis-information, and ensure the truth gets out.

Outside of negative perceptions, there is a real danger inherent in crisis mapping and social media that must be acknowledged. As Patrick Meier surmised in his presentation at the Where 2.0 conference in 2011, protestors are using this same technology to collaborate. He quoted a protestor from the Middle East who stated, "We

use Facebook to schedule protests, Twitter to coordinate, and YouTube to tell the world” (Oreilly, 2011). This is a powerful testament to how well social media can work albeit for nefarious purposes in this case.

Occupy movements around the world, flash mobs, etc. are coming together, coordinating massive demonstrations and having very powerful impacts on the world all enabled by Web 2.0 and social software. The government, especially law enforcement and homeland security professionals, will not be able to keep up or combat these movements if they are not engaged in the tools being used. On the converse of this argument, however, is a clear indication of a powerful tool that can just as easily be used to be aware of these movements and possible stop misinformation, disrupt protests, and create positive movements for change. Many of the people who want to have their voice heard want just as badly to see changes made. They are willing to participate in improving the process, but they must be engaged via the platforms that they are using (i.e., social media). The communities included within the Whole of Community are already there. As FEMA designs their strategy, they must account for the potential of malicious individuals, provide a means to get accurate information out, and empower/engage those individuals who want to make a difference and see positive change.

C. FEMA’S DESTINY PHASE FINDINGS AND RECOMMENDATIONS

The *Strategic Foresight Initiative* has paved the way for FEMA’s destiny. Tailored/focused scenario planning exercises similar to the foresight initiative would greatly benefit individual segments of the Whole of Community in planning and coordinating for risks and environmental factors specific to their roles and responsibilities. There are superordinate problems that exist as subsets within the Whole of Community and which require the collaboration of specific partners. Long-term housing, as an example, includes FEMA long-term recovery and housing specialists, the Department of Housing and Urban Development, the Department of Commerce, and others. Several of these problems are encompassed within the larger issue of resilience.

The goal of FEMA, as stated in the documentation reviewed, is to work through the Whole of Community to provide for an enhanced national resilience. With the ethos and principles of FEMA's *Pub 1* and *Strategic Plan* in hand, an efficient listening strategy to provide early indications and warnings, a culture of collaboration established via Web 2.0 technology, and supported by a trusted brand established to encourage participation across the broad spectrum of operations FEMA will be well poised to realize this goal. The key is that FEMA and the Whole of Community must be engaged during pre and post disaster time frames. Shared situational awareness applies to preparedness, protection, response, and recovery activities. It is recommended that FEMA engage and maintain involvement with emerging groups such as the standby volunteers. Scenario planning events and crisis mapping drills are emerging such as the Research and Experimentation for Local and International First Responders (RELIEF), which took place at Camp Roberts in Paso Robles, California in November 2011.

There are emerging new groups of volunteers as well, such as: CrisisMappers, CrisisCommons, Geeks Without Bounds, HumaniNet, Humanity Road, InSTEDD, and the list goes on. Each of these volunteer groups represent individuals with professional technology backgrounds who are committed to providing their services for the greater good of connecting organizations and survivors to assist in disaster relief, humanitarian aid, and other emergency management activities. FEMA needs to commit to staying abreast of these trends and interacting with these groups in order to facilitate continued learning of FEMA staff and the Whole of Community. Interaction will increase the chances for new innovations that will foster emergent solutions to the wicked problems the homeland security enterprise and the Whole of Community faces.

VII. CONCLUSIONS

The future is always beginning now. (Mark Strand)

This thesis viewed FEMA's implementation of Web 2.0 as an opportunity to be an agent of change within the Whole of Community and through the research looked to discover ways to better shape their strategy towards that aim.

A. SUMMARY OF FINDINGS

Web 2.0 has a lot to offer FEMA in regards to enabling collaboration within the Whole of Community and developing shared situational awareness. The focus for designing a strategy for the Whole of Community needs to be on shared problems where there are interdependencies. The Idea Factory case provides a roadmap on how to properly integrate and maintain new technology. It is important that the time is taken to assess the environment in terms of what applications are being used in the public and private sectors. Any new technology needs to be trained towards and should be launched in phases via pilots where feedback can be obtained and the tools can be improved. FEMA needs to create a culture of collaboration and experimentation within the organization to develop a cadre of employees who are familiar with and able to use this technology. The key to designing a comprehensive strategy is the understanding that it is more than just the sum of its applications. What is needed is clear understanding of inbound and outbound strategies and how they work together for the overall collaboration and shared situational awareness of everyone involved. FEMA has several good practices that, with the recommendations provided, would make valuable elements of their strategy. The development of a listening strategy for watch centers will greatly improve how FEMA is currently monitoring social media. The development of middle ware to connect all of the disparate systems at FEMA will allow for better information sharing, mapping, and graphical representations of any common operating pictures that are developed. Lastly, communities need to be structured in steady state during

preparation activities so that they are ready to interact during response and recovery phases. Trying to identify stakeholders and establish communications post-disaster is too late.

B. LIMITATIONS OF RESEARCH

The author acknowledges a theoretical sensitivity to this research in that the author is a participant observer within FEMA. Specifically, the author is a watch stander within FEMA's NWC, DHS's NOC, and member of FEMA's NRCS. These vantage points have been beneficial to this research in that the author has first-hand experience with attempting to initiate collaboration to establish shared situational awareness and build a common operating picture following disasters. This position provides the researcher with access to conversations and information that shape the appreciative inquiry process. There exists, however, a cognitive bias as the author has often been frustrated with the current system and resultant inability to connect with the Whole of Community to achieve desired results. The author acknowledges that this bias may have impacted the perspective of the discovery and dream phases of the appreciative inquiry process.

Normally, for an appreciative inquiry approach, rigorous surveys, interviews, and similar techniques would be applied similar to how a business might ascertain the voice of their customers or employees. Through the process of questioning employees in FEMA external affairs that have experience with social media and Web 2.0., the national and regional watch centers that are beginning to experiment with these tools, and the broader FEMA workforce, who are on the fringes of using this technology, a more accurate picture of FEMA's best state, desired future state, a structure for building it and the steps/actions/projects required to realize it may emerge. The scope of this research did not allow for the time required to apply such a technique; however, if the recommendations from this thesis are applied to FEMA's strategy a more formalized appreciate inquiry approach to validate these findings would be recommended.

Much of the data used for this thesis involved generalizations. TSA Idea Factory data was collected from the Website as interviews, surveys with employees, etc. were not

available. Similarly, facts for Ushahidi involved YouTube videos and statements from its Website. In depth interviews with the creators, volunteers, etc. would provide much more detailed insights into the organization and exactly how crisis mapping structures an environment of collaboration and develops shared situational awareness. The collective hermeneutic applied to the cases was done based on what the facts of the cases were available and what parts of conversations available implied. In essence, there was a double hermeneutic applied in that the researcher attempted to interpret meaning from how it appeared the stakeholders in each case interpreted meaning. Actual conversations from each case would provide a more accurate data set regarding exactly how the teams collaborated and developed their shared situational awareness.

C. MITIGATION OF LIMITATIONS

The use of established policy and strategy documents and statements of fact offset personal opinion and any tendencies towards pre-judgment related to the theoretical sensitivity. To address the sensitivity in relation to the case studies, the research covered examples from both inside and outside the Department of Homeland Security, as well as events that the author did not personally respond to or directly participate in.

The absence of employee interviews for the appreciative inquiry approach was mitigated through the use of personal experience and official policy and strategy documents. Experience with status quo operations and newly implemented procedures helped to shape the discovery phase. The dream phase was captured in FEMA's *Pub 1* and the strategic plan for 2011–2014. They are the self-proclaimed representations of the agency's ideal future state. The design phase was developed based on the ideas and visions incorporated in the dream phase. The *Strategic Foresight Initiative* implemented scenario planning to define the anticipated environment of the future. The previous phases were applied to this to understand what actions FEMA needed to take to increase the changes for realizing their dream state in this predicted destiny.

For the collective hermeneutic, the cases provided interviews of the staff via Webinars and YouTube videos. The Websites also provided a wealth of information regarding how the applications were implemented and lessons learned.

D. SIGNIFICANCE OF RESEARCH

The homeland security enterprise is uniquely positioned at a moment in time when everyone from the President to every day citizens have embraced transformational changing technology. Homeland security agencies as a whole are behind the curve in implementing this technology, but if they can overcome the resistances to change highlighted in this thesis, a world of opportunity awaits them. Web 2.0 is a disruptive technology that has changed the world of social interaction in ways we have not fully realized. As the cellular phone did not replace the telephone and automobiles did not replace the bicycle, Web enabled communication will not likely replace face to face and other legacy communications mediums. It does, however, as this research has shown, present a powerful tool for enhancing them. More importantly, it has a potential to build communities in ways homeland security has not been able to in real life. President Obama and his administration have shown a clear support for this technology through their open government and new innovations initiatives.

Moreover, FEMA has a force multiplier in that Administrator Fugate is not just a supporter but also an avid user of Web 2.0. It would behoove both FEMA as an agency, the Department of Homeland Security, and the broader homeland security enterprise to take advantage of this period in history to make monumental changes that can increase their efficiency, engage the public, and truly realize a Whole of Community in ways only envisioned on paper since the dreadful attacks on 9/11. All members of the homeland security enterprise share a desire and a need to develop shared situational awareness. Whether it be for emergency management decisions or other disciplines, accurate, timely information is crucial. The power of Web 2.0 can be applied across the board to greatly facilitate the necessary collaboration with stakeholders. The cases reviewed provide a wealth of knowledge regarding how to implement a Web-based solution properly, and this research provides a snapshot as to some of the emerging Websites and technology that are out there waiting for homeland security partners to engage with it. Through successful implementation of Web 2.0, we can increase our resilience as a nation to all hazards inclusive of terrorist attacks, catastrophic natural disasters, and man-made events. We owe it to our country, we owe it to our families, and we owe it to ourselves to try.

E. FURTHER RECOMMENDED RESEARCH

In her attempt to link a theoretical concept of leading to complexity theory, Joyce (2007) defines leading in homeland security as providing a trusted space for those working to secure the nation. It requires building and re-building communities of interest and being willing to construct the image and social reality of homeland security actively and internationally. Walker and Elbertson (2005) write about the role of leaders in setting the stage (i.e., structuring an environment that is conducive to collaboration). The literature reviewed for this thesis indicated that the composition of teams makes a difference in regards to how successful the collaboration and resultant shared situational awareness will be. These are all areas of study that were outside of the scope of this thesis, but would significantly further the research and literature surrounding the topics of collaboration and shared situational awareness. In addition to these topics, research is warranted as to what motivates people to participate in social networks to the extent they do. Rheingold (1993) suggests that Web 2.0 has the ability to create communities online that are not possible in real life. Empirical research that proves this is the case and explains this phenomenon would be very beneficial to constructing an environment that is conducive to enabling collaboration. This knowledge would assist leaders in forming teams, communities, etc. online to realize the potential of the Whole of Community and similar initiatives. If you are so inclined towards this research, the time is now and the turn is yours, as Godin (2011) states, all we have to do is poke the box!

THIS PAGE INTENTIONALLY LEFT BLANK

LIST OF REFERENCES

- Artman, H. & Garbis, C. (1988). *Situation awareness as distributed cognition*. Paper, Proceedings of the European Conference on Cognitive Ergonomics, Cognition and Co-operation, Limerick, Ireland.
- Bardach, E. (1998). *Getting agencies to work together: The practice and theory of managerial craftsmanship*. Washington, DC: Brookings Institution Press
- Barret, F. J. & Fry, R. E. (2005). *Appreciative inquiry. A positive approach to building cooperative capacity*. Chagrin Falls, OH: Taos Institute Publications.
- Baus, F. & Ramsbottom, C. A. (1999). Starting and sustaining a consortium. *New Directions for Higher Education*, 1999(106). Retrieved January 19, 2012, from <http://onlinelibrary.wiley.com/doi/10.1002/he.10601/pdf>
- Bolstad, C. & Endsley, M. (2003, May). *Tools for supporting team SA and collaboration In Army operations*. Paper presented Collaborative Technology Alliances Conference, College Park, Maryland.
- Brunelle, G. (2010, March). *Achieving shared situational awareness during steady-state operations in New York state: A model for success*. Master's thesis, Center for Homeland Defense and Security, Naval Postgraduate School, Monterey, California.
- Buskirk, E. V. (2010). Snowmageddon site crowdsources blizzard cleanup. *Wired*, 2010. Retrieved February 2012, from <http://www.wired.com/epicenter/2010/02/snowmageddon-crowdsources-blizzard-clean-up/>
- Carol, L. A. (1992). Desperately seeking SA. *TAC attack*, 32(3).
- Challenge.gov. (2011). *Preparing our communities before a disaster strikes*. Retrieved July 2011, from: <http://challenge.gov/FEMA/87-preparing-our-communities-before-a-disaster-strikes>
- Cook, S. D. N. & Brown, J. S. (1999). Bridging epistemologies: The generative dance between organizational knowledge and organizational knowing. *Organization Science*, 10(4): 381–400.
- Crisis Group. (2008). *Kenya in crisis. Africa report* (report no.137). Retrieved February 2012, from http://www.crisisgroup.org/~media/Files/africa/horn-of-africa/kenya/137_kenya_in_crisis_web.pdf

- Department of Homeland Security. (2008). *Homeland Security Presidential Directive-8* (rev). Washington, DC: author.
- Department of Homeland Security. (2011a, May). *Attachment X: social media to DHS 4300A sensitive systems handbook*, V8. Washington, DC: author.
- Department of Homeland Security. (2011b, January). *Privacy impact assessment for the Office of Operations Coordination and Planning: Publicly available social media monitoring and situational awareness initiative update*. Report. Washington, DC: author.
- Dickover, N. (2010, March). *Crisis commons: About*. Retrieved December 2011, from <http://crisiscommons.org/about/>
- Drapeau, M. & Wells, L. (2009, April). *Social software and national security: An initial net assessment*. Paper presented at Center for Technology and National Security Policy at the National Defense University, Washington, DC.
- Drapeau, M. (2009, February). Government 2.0: The rise of the Goverati. *ReadWriteWeb*. Retrieved January 2012, from http://www.readwriteweb.com/archives/government_20_rise_of_the_goverati.php
- Endsley, M. (1988). *Situation awareness global assessment technique (SAGAT)*. Paper presented at the National Aerospace and Electronics Conference (NAECON), New York.
- Endsley, M. (1995, March). Toward a theory of situation awareness in dynamic systems. *Human Factors*, 37(1).
- Federal Emergency Management Agency. (2008). *National response framework*. Washington, DC: author.
- Federal Emergency Management Agency. (2009). *NIMS FAQ: What is a common operating picture?* Retrieved January 9, 2012, from <http://www.fema.gov/emergency/nims/FAQ.shtm>
- Federal Emergency Management Agency. (2010a). *Federal Emergency Management Agency publication 1*. Washington, DC: author.
- Federal Emergency Management Agency. (2010b). *FEMA situational awareness viewer for emergency response fact sheet*. Washington, DC: author.
- Federal Emergency Management Agency. (2010c). *Web 2.0 policy. FEMA P-262-3*. Washington, DC: FEMA External Affairs.

- Federal Emergency Management Agency. (2011a). *FEMA Strategic plan for fiscal years 2011–2014*. FEMA P-806. Washington, DC: author.
- Federal Emergency Management Agency Response Directorate. (2011b). *Response directorate strategic plan for FY 2011*. Washington, DC: author.
- Forcier, M. F. (2011, September/October). Innovation through collaboration: new pathways to success. *Trusteeship*, 5(19).
- Frost, R. (1920). *Mountain interval*. New York: Henry Holt and Company.
- Gadamer, H.G. (1976). *Philosophical hermeneutics*. Berkeley, CA: University of California Press.
- Gadman, S. (1997). *Power partnering: A strategy for business excellence in the 21st century*. Boston: Butterworth-Heinemann.
- Gadamer, H.G. (2004). *Truth and method* (J. Weinsheimer & D. G. Marshall, Trans.) (2nd ed. rev.). London: Continuum.
- Geel, J. V. (2010). *On the power of crowdsourcing: An interview with Erik Hersman*. Retrieved February 2012, from <http://johnnyholland.org/2010/11/on-the-power-of-crowdsourcing-an-interview-with-erik-hersman/>
- Giridharadas, A. (2010). Africa's gift to Silicon Valley: How to track a crisis. *New York Times*. Retrieved February 2012, from <http://www.nytimes.com/2010/03/14/weekinreview/14giridharadas.html?pagewanted=print>
- Godin, S. (2011). *Poke the box*. Hastings, NY: Do You Zoom Inc.
- Gray, B. (1989). *Collaborating: Finding common ground for multiparty problems*. San Francisco, CA: Jossey-Bass Publishers
- Green, M., Odom, J. V. & Yates, J. T. (1995) *Measuring situational awareness with the "deal observer."* Proceedings of International Conference on Experimental Analysis and Measurement of Situation Awareness, Embry-Riddle Aeronautical University Press, Florida.
- Grondin, J. (1991). *Introduction to philosophical hermeneutics*. New Haven, CT: Yale University Press.
- Hansen, S. & Rennecker, J. (2006). Collective hermeneutics in a systems development process. *Sprouts: Working Papers on Information Systems*, 6(6). Retrieved January 2012, from <http://sprouts.aisnet.org/6-6>

- Hocevar, S., Jansen, E., & Thomas, G. F. (2004). *Building collaborative capacity for homeland security: Context and problems*. Brief. Naval Post Graduate School: Monterey, CA
- Howe, J. (2006). The rise of crowdsourcing. *Wired*, (06).
- Howe, J. (2008). *Crowdsourcing: Why the power of the crowd is driving the future of business*. New York: Three Rivers Press.
- Jones, G. (2006a, September). 15 world-widening years. *InformationWeek*.
- Jones, G. (2006b, September). Sidebar: The skinny on Web 2.0 *InformationWeek*.
- Joyce, N. (2007). *Can you lead me know? Leading in the complex world of homeland security*. Master's thesis, Center for Homeland Defense and Security, Naval Postgraduate School, Monterey, California.
- Kaufman, D. (2011). *Two documents for FEMA's future*. Blog. Retrieved March 2012, from <http://blog.fema.gov/2011/03/two-documents-for-femas-future.html>
- Majumdar, D. (2006). Collaboration among government agencies with special reference to New Zealand: A literature review. *Social Policy Journal of New Zealand* (27).
- Maslow, A. H. (1943). A theory of human motivation. *Psychology Review*.
- Meier, P. (2010). *Taking the lead: Ushahidi-Haiti@Tufts*. Blog post. Retrieved February 2012, from <http://blog.ushahidi.com/index.php/2010/02/19/taking-the-lead-ushahidi-haiti-tufts/>
- Melaville, A., M. Blank & G. Asayesh. (1993). *Together we can: A guide for crafting a profamily system of education and human services*. Washington, DC: U.S. Government Printing Office.
- Moghaddam, F. M. (2010). *The new global insecurity: How terrorism, environmental collapse, economic inequalities, and resource shortages are changing our world*. Santa Barbara, CA: Praeger Security International
- Nofi, A. (2000). *Defining and measuring shared situational awareness*. Paper, Center for Naval Analyses, Alexandria, VA.
- O'reilly, T. (2005). What is web 2.0? *O'reilly media*.
- O'reilly Media. (2010). *Crowdsourcing the impossible: Ushahidi-Haiti*. Briefing. Where 2.0. Conference 2010. O'reilly Media. Retrieved February 2012, from <http://www.youtube.com/watch?v=FEHgLjQyEXk>

- O'reilly Media. (2011). *The future of crisis mapping for disaster response*. Briefing. Where 2.0. Conference 2011. O'reilly Media. Retrieved February 2012, from http://www.youtube.com/watch?v=M_NguESRZ4g&feature=relmfu
- Pelfrey, W. V. (2005). The cycle of preparedness: establishing a framework to prepare for terrorist threats. *Journal of Homeland Security and Emergency Management*, 2(1), Article 5.
- Prefontaine, L., L. Ricard, H. Sicotte, D. Turcotte & S. Dawes (2000) *New models of collaboration for public service delivery: Worldwide trends*. Working Paper prepared for CEFRIO.
- Rheingold, H. (1993). *The virtual community: Homesteading on the electronic frontier*. Reading, MA: Addison-Wesley Publishing Company.
- Rotenberg, M. & McCall, G. (2012). *Hearing on DHS monitoring of social networking and media: Enhancing intelligence gathering and ensuring privacy*. Statement for the Record. Washington, D.C.: House Homeland Security Committee's Subcommittee on Counterterrorism and Intelligence, U.S. House of Representatives.
- Salas, E., Dickonson, T. L., Converse, S. & Tannenbaum, S. I. (1992). Toward an understanding of team performance and training. In R. W. Swezey & E. Salas (Eds.), *Teams: Their training and performance*. Norwood, NJ: Ablex
- Saxe, J. G. (1880). *The Poems of John Godfrey Saxe: The complete edition*. Cambridge, MA: The Riverside Press.
- Shu, Y., & Futura, K. (2005). An inference method of team situation awareness based on mutual awareness. *Cognition, Technology & Work*, 7:
- Smith, K. & Hancock, P. A. (1995). *The risk space representation of commercial airspace*. Proceedings of the 8th International Symposium on Aviation Psychology. Columbus: OH.
- Snowden, D. J. & Boone, M. E. (2007, October 10). A leader's framework for decision-making. *Harvard Business Review*.
- Surowiecki, J. (2005, August). *The wisdom of crowds*. New York: First Anchor Books.
- Toner, S. (2009, June). *Creating situational awareness: A systems approach*. Paper, Institute of Medicine Forum on Medical and Public Health Preparedness for Catastrophic Event Workshop, Washington, D.C.

- Transportation Security Administration. (2010). *Forum call: Using social media to engage employees at TSA*. Webinar. Retrieved January 2012, from: <http://www.howto.gov/training/classes/TSA-ideafactory>
- Transportation Security Administration. (2011). *Who are we*. Retrieved January 2012, from http://www.tsa.gov/who_we_are/mission.shtm
- U.S. Congress. (2002). *Homeland Security Act of 2002*. Public Law 107-296. Washington, DC: U.S. 107th Congress. Retrieved March 2012, from http://www.dhs.gov/xlibrary/assets/hr_5005_enr.pdf
- Ushahidi (2008, January). *About Ushahidi*. Retrieved February 2012, from <http://blog.ushahidi.com/index.php/about/>
- Ushahidi. (2012). *Ushahidi-about us*. Retrieved February 2012, from <http://www.ushahidi.com/about-us>
- Van Leuven, L. (2009, March). *Optimizing citizen engagement during emergencies through use of web 2.0 technologies*. Master's thesis, Center for Homeland Defense and Security, Naval Postgraduate School, Monterey, CA.
- Waldrop, M. (2008). *DARPA and the Internet revolution*. Retrieved April, 2011, from: <http://www.darpa.mil/About/History/History.aspx>
- Walker, H. P., Elbertson, K. (2005). Collaboration: Leadership in a global technological environment. *OJIN: The Online Journal of Issues in Nursing*, 10(1), Manuscript 5.
- White House (2011). *Idea factory*. Retrieved January 2012, from <http://www.whitehouse.gov/open/innovations/IdeaFactory>
- Whitney, D. & Cooperrider, D. (2003). *The power of appreciative: A practical guide to positive change*. San Francisco: Berett-Koehler Publishers.
- YouTube (2010, February). *Interviews with Ushahidi team members*. Retrieved February 2012, from <http://www.youtube.com/watch?v=huQpn0D0eK4>

INITIAL DISTRIBUTION LIST

1. Defense Technical Information Center
Ft. Belvoir, Virginia
2. Dudley Knox Library
Naval Postgraduate School
Monterey, California
3. William Carwile
Federal Emergency Management Agency
Washington, D.C.
4. Russell Washington
Federal Emergency Management Agency
Washington, D.C.
5. Shayne Adamski
Federal Emergency Management Agency
Washington, D.C.
6. David Kaughman
Federal Emergency Management Agency
Washington, D.C.